





A Duty as Well as a Right

"It is, in my opinion, not only the right but the duty of a railroad to present these matters to the public from its viewpoint, but in so doing it should be scrupulously accurate in its statements of facts.—*Hon. Charles A. Prouty, I. C. Commissioner.*

They Meet the Commissioner's Requirement

I have yet to see a statement issued by your Bureau which is not fully borne out by the facts."—*H. B. Ledyard, Ch. Com. Michigan Central R. R., May 4, 1914.*

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APPLY TO
BUREAU OF RAILWAY NEWS AND STATISTICS
RAILWAY EXCHANGE BUILDING
CHICAGO

THE RAILWAY LIBRARY,

1913

[FIFTH SERIES]

A COLLECTION OF NOTEWORTHY ADDRESSES AND
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COMPILED AND EDITED BY

SLASON THOMPSON

DIRECTOR OF BUREAU OF RAILWAY NEWS

AND STATISTICS
CHICAGO



CHICAGO

R. R. DONNELLEY & SONS COMPANY

1914

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INTRODUCTION

THIS, the fifth annual issue of *THE RAILWAY LIBRARY*, brings together between boards selections from the more noteworthy addresses and papers delivered or written in 1913 relating to railway subjects. The general rule has been to restrict the selection to matter first given to the public in the year named,* but the date of publication enables the inclusion of several articles of the current year.

Following the theory, somewhat in eclipse in certain quarters just now, that we can best judge the progress and tendencies of the present by the achievements of the past, this volume opens with a brief summary of "Fifty Years of British Railways" extracted from the Jubilee Number of the *London Railway News*. This will serve as a companion picture to the graphic story of James J. Hill's "Life Adventure," covering forty years of railway building in the United States in the volume for 1912. The problems confronting railway builders in the two countries were widely different, but the aims, **adequate service at reasonable and remunerative rates**, were and are identical.

A cut of the latest, but not the last, word in locomotives naturally serves as a tailpiece to the fifty years of locomotive performance inaugurated by *The Rocket*.

Railway conditions as they are, outlined in the testimony of President Samuel Rea of the Pennsylvania Railroad, find a place in this volume because his testimony sets forth conditions common to all progressive American railways. The group of papers immediately following views the same situation from several different angles, those from the pens of Interstate Commerce Commissioner Meyer and Clément Colson of the French Institute being especially enlightening.

Next follows a series of articles relating to the nationalization of railways treated from the historical, political and economic points of view. The Library is especially to be congratulated on permission to use the concluding chapter of Samuel O. Dunn's recent work on "Government Ownership of Railways" (Appleton & Co.) and an exhaustive synopsis of Prof. W. J. Cunningham's analysis of the state railways of Prussia-Hesse.

The two illustrated articles in the number, "A Nation's Neglect,"

giving typical pictures of the reckless use of railway tracks as commons for all sorts of trespassing, and the story of "The Ohio Flood of 1913," showing the dangers to which American railways are always exposed from the unforeseeable and irresistible forces of nature, bring these aspects of railway operation vividly to the mind of the reader.

The variety of subjects covered in this volume exceeds that in any former issue, as a glance at the table of contents testifies.

As in former issues the concluding chapter consists of the annual report of the Bureau of Railway News and Statistics in which is presented the latest information in regard to American and foreign railways — the space devoted to the latter being greatly increased.

SLASON THOMPSON.

CHICAGO, June, 1914.

FIFTY YEARS OF BRITISH RAILWAYS

EXTRACTS FROM THE LONDON "RAILWAY NEWS"
JUBILEE NUMBER, 1914.

The period 1800-1820 may be considered the first stage of development. In 1801 the Surrey Iron Railway Act, the first true railway private act, was passed for a railway to carry agricultural produce into London. Between 1801 and 1820 some nineteen other private acts for goods and mineral railways, all on the type of the Surrey Railway, were passed. They include the Carmarthenshire Railway, the Sirhowy Tramroad, the Oystermouth Railway, the Plymouth and Dartmoor Railway and the Kingston Railway.

The railways of this period were expressly authorized as highways and nothing more. Any person was to be entitled to convey his own goods traffic on them provided he paid the tolls prescribed by the act and used only carriages and wagons approved of by the company. Horse haulage, and that to be provided by the conveyor himself, and not by the company, was the only motive power contemplated. No passenger traffic was intended. The companies were not empowered to act as public carriers of goods or to provide haulage, carriages or wagons. Their powers were limited to taking the tolls on goods conveyed by other persons. In many cases, indeed, they were authorized to "let to farm" the tolls in the manner of tax gatherers of old. Such was the English chrysalis — mere ownership of a road.

Towards the end of the embryo stage, there were portents in the railway world. A steam locomotive with toothed wheels working on a rack rail was drawing coals in Middleton Colliery, Northumberland, in 1811. Three years later, on June 25, 1814, the triumphant success of George Stephenson's locomotive on the Killingworth Railway, proved conclusively the sufficiency of ordinary friction between rail and wheel for tractive power. Still scepticism reigned supreme. So much so that in 1821, when the first Stockton and Darlington Railway Act was passed, the promoters contented themselves with a bill for a horse-worked goods railway, precisely on the model of the Surrey Iron Railway of 1807.

This period the writer has termed the period of transition. The

railway private acts of the period show the evolution of railway companies up to but just short of the stage at which they themselves became public carriers. The distinctive features of all the acts of this period as compared with the preceding period were: (a) provision for passenger traffic; (b) power to company to provide mechanical motive power in the shape of steam locomotives and stationary engines and to haul traffic of traders with them; (c) right to public to use railways with their own carriages and engines.

The Stockton and Darlington Railway Act, 1823, was the first Act to confer power to use steam and the first to provide for passenger traffic. The flange was at that time on the rail and the intention of the act was that ordinary road passenger vehicles should be drawn on the railway. By that act the company was entitled to take tolls



OPENING OF THE FIRST ENGLISH RAILWAY BETWEEN STOCKTON AND DARLINGTON, SEPTEMBER 27, 1825.

Note to early cut:—"The man on horseback went in front of the train to warn people and see the line clear."

for: (a) goods conveyed by traders in their own wagons; (b) "chariots, chaises, cars, gigs, landaus, wagons, carts and other carriages" containing passengers; (c) locomotive power when supplied by the company. The railway was opened in 1825; the coaches of passengers were drawn by horses, the trains of wagons of coal and other merchandises by locomotives.

The immediate success of the Stockton Railway led to the first "railway rush." Schemes of all kinds in every place were projected. Mr. Canning described them as "springing up after the dawn of the morning and passing away before the dews of the evening descended."

The most important act of this period undoubtedly was the Liverpool and Manchester Railway Act, 1826. That act authorized steam engines, either locomotives or stationary engines, but prohibited the former in Liverpool. It authorized the company to charge tolls on (a) goods conveyed by traders in their own wagons, (b) passengers conveyed by carriers in their own carriages — not tolls on the carriages merely as in the Stockton Act; (c) locomotive power where supplied by the company. This act was unique in one respect among the Acts of this period. It required the company to convey

passengers and goods. This was an obligation imposed on the company under very special circumstances. Combinations among canal owners between Liverpool and Manchester and combinations among the carriers on the canals led to the original promotion of the railway in 1824 and the promoters desired to have some means of combating combinations of carriers on the railways. It was not till the success of Stephenson's locomotive, the "Rocket," at the



Race of Locomotives at Rainhill, near Liverpool, in which George Stephenson's "Rocket" Won, 1829.

Rainhill trials on October 6, 1829, that the company decided to adopt steam locomotives as the tractive power upon the railway. The railway was opened September 13, 1830, its passenger traffic immediately surpassing every expectation.

At the close of the transition period railway companies under their private acts were: (1) owners and toll takers on a road open to the public; (2) suppliers of mechanical motive power on that road.

Full development the writer regards as the amplification of function from mere ownership of the railway to acting as the sole



View of the "Novelty" with a Train of Engine and "Coaches" in 1829.

conveyor of traffic on the railway. About 1830 companies were first constituted one of the many competitive conveyors of traffic on the railways. It was not, however, till 1845 that the railway companies themselves were reluctantly recognized by Parliament as the only practicable conveyors. From 1830-1840 Parliament thought it had found in the railway companies effective competitors to the common carriers using the railway. Between 1840-1845 economic conditions proved too strong for that parliamentary conception and parliament was concerned to render the competition of the carriers

effective as against railway companies. After 1845 Parliament ultimately admitted the economic futility of that policy, acquiesced in railway companies being sole providers on the railway of facilities of transport, and set itself to fix and regulate the charges.

The London and Birmingham Railway Act, 1833, and the Great Western Railway Act, 1835, may be taken as typical of the railway private acts of 1830-1840. By these acts the company was entitled to charge: (a) tolls at so much per mile on (1) goods, and (2) persons and animals conveyed in traders' carriages. The company is empowered to supply locomotive power and charge therefor **any sum they think proper**. The company is further authorized by means of their own locomotive power and in carriages supplied by traders or by the company to convey passengers, animals, or goods, and for such conveyance to make a **reasonable charge**, in addition to road toll and locomotive toll. It will be observed that no limit is fixed to the locomotive toll, and none to the conveyance toll save "reasonableness" in the minds of a judge and jury. Parliament at that time professedly relied on competition between the railway company and the carriers inclining to assist the former. The acts imposed on both company and carriers a maximum fare of generally $3\frac{1}{2}$ d. (7 cents) per mile for conveyance of passengers.

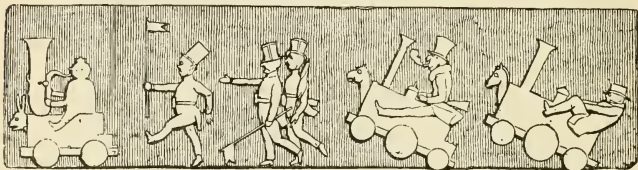
From 1840 to 1845 . . . was the period of declining competition between railway companies and carriers for conveyance of traffic on the railways. In *R. v. London and Southwestern Railway Company* (1842), the first railway rating appeal reported, we find Lord Denman stating that "the supposition of a free competition of carriers on the same railway was little less than absurd." The select Committee (commons) on Railways, 1844 (the famous "Five Reports" Committee), found in 1844 that such competition was dead, and could not on economic grounds be resuscitated. We accordingly find the railway private acts taking a new form. They fix definite limits to each toll and rate which the company is authorized to take. No longer are the companies allowed to charge "such sums as they think fit," "such reasonable sum as they think proper." The company we find restricted to taking a toll for use of the railway in respect of goods: (1) So much per ton per mile in any event; (2) if conveyed in company's carriages so much additional per ton per mile; (3) if hauled by company's locomotives so much more per ton per mile. The company were further authorized to convey. Their maximum "toll," therefore, for conveyance of goods would be the sum of (1)+(2)+(3).

The charging by the companies of the aggregate of the three tolls for conveyance led to considerable agitation. . . . The Standing Orders of the House of Commons were accordingly altered in 1846 making it obligatory on every Select Committee on a railway bill to insert a clause fixing the maximum rates for conveyance by the company of passengers and goods to include every expense, road toll, locomotive toll, carriage toll — everything. . . . The maximum conveyance rates in acts since 1845 are always found fixed lower than the total of road toll, locomotive toll and carriage toll.

* * *

The year 1845 saw the railway companies left the sole conveyors of traffic on the railway. This was the year of the "railway mania"; 1,428 new railway companies with a total capital of 701 millions (\$3,413,870,000) had been registered. . . . Powers were granted by Parliament in 1845 to construct no less than 2,883 miles of new railways in Britain at an expenditure of £44,000,000 sterling (\$214,280,000); and in the following session of 1846, applications were made to Parliament for powers to raise £389,000,000 sterling (\$1,894,430,000) for the construction of further lines, and they were actually conceded to the extent of 4,790 miles (including 60 miles of tunnel), at a cost of about £120,000,000 sterling (\$584,400,000). Here are extracts from "Punch's" account of the "Opening of the Railway (1845) Parliament," which was to be "a Parliament devoting itself exclusively to railway business, entirely separate from the legislature employed in the ordinary work of the session. Every established line should be allowed to send two members, while the new schemes should each return a representative, the privilege of voting being conferred on those who have paid their deposits. The stag districts might, perhaps, be allowed one member to protect their interests; and every person who had signed his name to a deed for any one else should be considered a bona fide stag for election purposes. In the debates the members could allude to each other as the honorable representatives of the line that might have returned them; or, if in the Upper House, the titles of Lord Thames Embankment, the Marquis of Central Terminus, Baron Broad Gauge and Earl Atmospheric would be extremely appropriate. London is apparently to be laced with iron work. . . . We have Metropolitan Junctions that are to go all around London without going into it — a convenience that those who are in the habit of taking a circuit of the entire outskirts of London will duly appreciate. The contemplated procession of the opening of the Railway Parliament . . . will open with Punch in person and

his dog Toby in character, who will have at his tail the speaker, mounted on his engine of state drawn by a hundred jet black coals and followed by enthusiastic crowds. After them will come a stoker playing favorite airs on a steam cornet — a — piston! followed by a few engineers having tough work to manage their engines."



The subjoined portions of two articles . . . written for "The Illustrated London News" of 1845, further indicate the extent of railway mania.

"John Bull, with open mouth, is ready to swallow any quantity of Railroad. . . . The surveyor's pole appears to be turned into something like an ancient divining rod to discover the hidden treasures in the bowels of the earth. Railway speculation has become the sole object of the world . . . the lowest man is carried away by the current and becomes absorbed in the vortex.

" 'Why not I as well as my neighbor,' says the baker, 'it is the most rapid way of making one's bread.'

" 'It's nothing but a joint concern,' says the butcher, 'I shall have a cut of the carcase.'

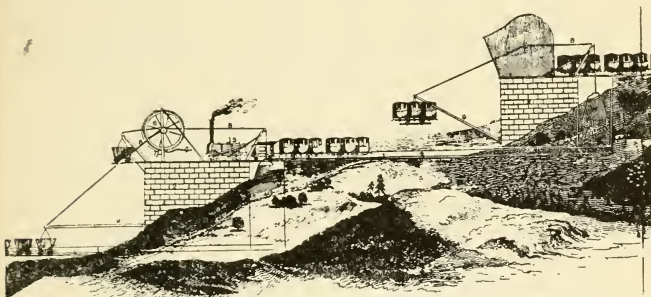
" 'I hope it will last,' says the shoemaker, 'for what boots it sticking to trade when your sole chance is the railroad?' "

* * *

Many inventions were naturally submitted to the directors of railways in the early days. Our copy of the circular explaining the inventor's "Principle for Preventing Accidents by Collisions on Railways" . . . was addressed to the chairman of the South Western Railway . . . under date February, 1841. Under this system "at the back of the last carriage (or a special one put for the purpose) some wool bags are placed on wood or iron supports and resting on sacking with rings to slide on rods." Other wool bags were placed in front of the engine and between the carriages. Another system of meeting the dangers of collisions is shown . . . in which atmospheric buffers were proposed. A circular addressed to "The London

and Birmingham Railroad Co." under date of April 28, 1835, . . . shows how the cost of tunnels could be avoided whilst the passengers would have "the pleasure of traversing the open country."

Space does not permit any detailed reference to the battle of the motive powers that commenced with the Liverpool and Manchester bill of 1836. It took the form ultimately of steam vs. compressed air. The latter, though authorized in a number of cases, and recommended by the Commons Committee on atmospheric railways, 1845, was uniformly and consistently rejected by all select committees on



How Tunnels Could Be Avoided. Similar "Locks" on the Opposite Side of the Hill Brought Locomotives and Cars Back to the Level.

bills from 1846 onwards. . . . So ended this attempt to introduce a rival to the iron horse. . . . With the Great Western Bill there was inaugurated the struggle of the gauges — the broad and the standard. The conflict lasted with sporadic skirmishes up till the condemnation of the broad gauge by the Royal Commission on Railways, 1867.

It is interesting to recall that the old Eastern Counties was the first railway to provide smoking carriages, . . . the "divans," as they were called, being "launched," on the Cambridge and Newmarket line, where "the peculiarity of a portion of the traffic suggested their use," in September, 1846, or twenty years before smoking accommodation was made obligatory by Act of Parliament.

Early in the history of railways the post office authorities recognized the value of "the iron horse" for the work of the department, and . . . on January 6, 1838, a sorting carriage (consisting of a horse box temporarily fitted up) was run as an experiment on the Grand Junction Railway between Birmingham and Liverpool. . . . The experiment was considered so successful that on June 19, 1838,

it was decided to make the traveling post office a permanent institution. The first permanent sorting carriage was built by the Grand Junction Railway Company, its dimensions being: height 7 feet, length 16 feet, width 7 feet 6 inches. Its exterior was fitted with apparatus for exchanging mail bags en route, devised by Mr. John Ramsay, an officer of the Missing Letter Branch, subsequently (1848) improved by Mr. John Dicker, an inspector of mail coaches. The apparatus, as settled by Dicker, is substantially that in use at the present time. The immediate effect of the introduction of the traveling post office was to render unnecessary the making up of 800 or 900 bags, inasmuch as each town made up one bag for the traveling post office, instead of the fourteen or fifteen which had to be made up for the mail coach, and the traveling post office re-sorted the letters.

* * *

As pioneers of a new industry, those who built the early railways of this country had to face difficulties, opposition and extortion which are largely responsible for the heavy cost of the lines as compared with those of other states. Mr. J. C. Jeafferson, in his "Life of Robert Stephenson," published in 1864 — fifty years ago — wrote: "Unfortunately for the national character, there were members of the Legislature who systematically sold their parliamentary interest for money considerations. Before quitting this painful part of an important subject, it ought again to be impressed on the reader that railway companies were subjected to extortion alike **by all ranks of society**. When a railway passed through a provincial town its directors found the demands of merchants and petty traders quite as exorbitant as those of the landed aristocracy."

The waste of capital, directly and indirectly, in the formation of railways was in 1852 estimated at not less than £12,000,000 (\$58,-440,000) apart from the loss which has been incurred in the support of unsuccessful bills and the maintenance of unsuccessful opposition. This sum would have been sufficient to construct a railway 600 miles long at the rate of £20,000 (\$97,400) a mile; while the interest which has to be paid by the public in the increased cost of existing line amounts, at 5 per cent, to £600,000 (\$2,922,000).

* * *

Half a century ago the locomotive engine had realized a considerable degree of development, and quite a number of features now recognized as standard had attained introduction. . . . The single driver was usual for express passenger services. . . . Most of the essentials had already been provided by early engineers; the past

fifty years is principally a record of increased dimensions, improved design, fittings, adjuncts and appliances.

How far it is necessary to attribute the exceptional character of American locomotive practice to the freedom of the loading gauge, conditions, requirements and environment is a moot question, but the fact remains that North America has provided a distinctive class of practice, and has witnessed the introduction of perhaps the most remarkable series of locomotive designs in use anywhere.

In early years it can hardly be said that passenger accommodation was anything to boast about. There were "bed carriages," it is true; and in due course the first-class passenger began to receive special attention; but it was a long time before the inferior classes were provided with really good accommodations.

. . . For special European trains making long journeys, vestibuled dining, sleeping and other conveniences were provided at a period not so very recent; **but it is to the Pullman car, introduced first in America** and then adopted in Europe, that the excellence of American and European travel is due. Although this country has never, as a whole, received the Pullman car with the favor which it realizes in other countries, those vehicles which are in use on the London, Brighton and South Coast, South Eastern and Chatham, and Metropolitan Railways, are very highly appreciated. On the first mentioned line a considerable number of cars are in use, employed on many services. "The Southern Belle" is, however, generally recognized as the culmination of this policy, and to constitute what is claimed to be "The Most Luxurious Train in the World."

. . . Each car is decorated in a different style and one of the vehicles is always of buffet type. In the case of the South Eastern and Chatham Railway, the cars are entirely restricted to the Continental services. A fair number of cars are, however, required, as two, three, or even four may be included in one train; and it is by no means unusual for the demand for seats to be greater than the provision.

There is a radical differentiation between home and colonial or foreign freight rolling stock, in many cases requiring special designs for use abroad — such as special cattle wagons, and in other cases calling for development of some types to a degree which is not usual here. The general tendency is to employ large bogie vehicles, frequently of pressed steel construction. Indeed, on the whole, the work done by wagon-building firms in this country for use abroad is of a more interesting and advanced character, from the engineering point of view at least, than that usually found on our own railways.

The returns . . . indicate how closely associated are the railways of the country with its industrial developments, and how generous have been the facilities provided by the railway companies to meet the growth and expansion of national industrial enterprise. For some of the earlier years the figures of the goods traffic movement were not available and the averages for the quinquennial periods are only complete from 1860. It will be seen that from £190,000,000 in the period 1860-4 the number of passengers carried — exclusive of season ticket holders, a very important factor in recent years — increased to 1,248,000,000 in 1905-9 and to 1,294,337,000 in 1912; the quantity of minerals from 66,000,000 tons to 386,000,000 tons and 401,000,000 in 1912, and of general merchandise from 31,000,000 tons to 105,000,000 tons and 119,000,000 in 1912. The total tonnage conveyed, worked out per head of the population, rose from 3.34 tons to 11.13 tons for the last quinquennial period, and to 11.46 tons for 1912.

From 47 per cent in 1860 the percentage (of expenses to total receipts) rose to 64 per cent in 1908, with a reduction to 62 per cent for 1909, 1910 and 1911, and a rise to 63 in 1912 . . . With a rise from 111,000,000 in 1854 to 1,294,000,000 in 1912 in the number of passengers carried, and from 65,000,000 tons in 1856 to 520,000,000 tons in 1912 in the total quantity of goods and minerals conveyed, the percentage of net receipts, representing the railway companies' profits, has fallen steadily from 4.19 in 1860, 4.23 in 1864 and as much as 4.74 per cent in 1872, to 3.43 in 1909, from which there was a recovery to 3.59 in 1910 and 3.67 per cent in 1911, the 1912 figure falling to 3.55.

Socialist orators and writers are at much pains to show that the railways of this country are owned by wealthy monopolists, and it is useful, therefore, occasionally to recall the fact that there is probably no industry in the country the real interest in which are more widely spread. According to the last Board of Trade returns, compiled in 1912, there were the following holders of stock:

Ordinary	384,000
Preference	323,000
Debentures	156,000
Total holders	798,000

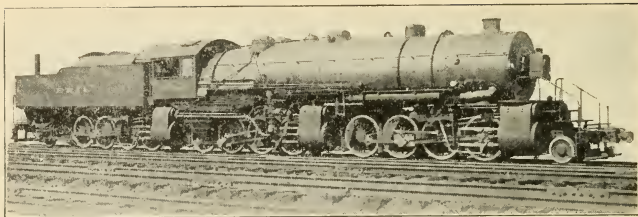
These stocks were not held by a few millionaires, but by thousands of small proprietors, to whom their income from the dividends received is of vital importance. The Midland Railway Company, for

instance, had at the close of the June half-year of 1912, 83,773 shareholders and 16,830 debenture holders, entailing the sending out of 100,603 dividend warrants. Of the shareholders, 26,000 held under £500 of stock.

* * *

The future of railway companies in this country is not bright. They have lost and are losing their valuable suburban traffic. The tramways or light railways of companies and corporations have relieved them of a good deal of their "daily bread traffic." The rail-less-trolley system by which vehicles are run by electricity supplied to the motor by overhead wires, on ordinary roads, which has at last "caught on," and is being largely developed, will relieve railway companies of a great deal more of their suburban and sub-suburban passenger traffic. Then, again, the motor vehicles or omnibus undertakings have already severely injured the tramway traffic of the London County Council, and must also militate largely against railway short distance traffic. On the London County Council tramways, in consequence of that competition, the receipts per mile have fallen from 11.95 d. (24 cents) in 1907 to 9.73 d. (19.5 cents) in 1912. But, further, motor vehicles are being largely used for the delivery of goods for considerable distances round centers of distribution like Liverpool and Manchester. Indeed, at the present time the railway monopoly is confined to long distance passengers, parcels and goods traffic. Besides, there is no great probability of the evolution of the railway system of this country. The companies have for the most part ceased to extend their lines and the independent promotion of railway lines is a thing of the past. Indeed, railway companies themselves seem to have come to the conclusion that the only way to increase or maintain their dividends is by effecting economies instead of casting nets to secure more and more custom.

It is this idea that has led to the great pooling arrangements which have divided England into two great competitive districts. . . . The theory of these arrangements or amalgamations is that competition between railway companies is a silly thing. It is odd that it has taken railway companies more than half a century to find that out.



THE MALLET TRIPLEX
THE MOST POWERFUL LOCOMOTIVE EVER CONSTRUCTED
BUILT FOR ERIE RAILROAD, 1914,
BY THE BALDWIN LOCOMOTIVE WORKS
General Data

Gage.....	4 ft. 8½ in.
Service.....	Pusher
Fuel.....	Bituminous coal
Tractive effort, compound.....	160,000 lbs.
Weight on leading truck.....	32,050 lbs.
Weight on first group of drivers.....	250,000 lbs.
Weight on second group of drivers.....	254,300 lbs.
Weight on third group of drivers.....	257,300 lbs.
Weight on trailing truck.....	59,400 lbs.
Total weight on drivers.....	761,600 lbs.
Total weight of engine and tender in working order.....	853,050 lbs.
Wheel base, driving, each group.....	16 ft. 6 in.
Wheel base, total driving.....	71 ft. 6 in.
Wheel base, total engine and tender.....	90 ft. 0 in.

Cylinders and Valves

Diameter and stroke—2 H. P. and 4 L. P.....	36 in. by 32 ins.
Kind of valves.....	Piston
Diameter of valves.....	16 in.

Wheels

Driving, diameter over tires.....	63 ins.
Driving journals, diameter and length.....	11 ins. by 13⅛ ins.
Engine truck wheels, diameter.....	33½ ins.
Trailing truck wheels, diameter.....	42 ins.

Boiler

Style.....	Conical
Working pressure.....	210 lbs.
Outside diameter of first ring.....	94 ins.
Firebox, length and width.....	162 ins. by 108 ins.
Firebox plates, thickness.....	¾ ins. and ⅝ ins.
Firebox water space.....	F., 6 in.; S., 5 in.; B., 5 in.
Tubes, number and outside diameter.....	326—2¼ ins.
Flues, number and outside diameter.....	53—5½ ins.
Tubes and flues, length.....	24 ft.
Heating surface, tubes.....	6,418 sq. ft.
Heating surface, arch tubes.....	88 sq. ft.
Heating surface, firebox and combustion chamber.....	380 sq. ft.
Heating surface, total.....	6,886 sq. ft.
Heating surface, superheater.....	1,584 sq. ft.
Grate area.....	90 sq. ft.

Tender

Water capacity.....	10,000 gal.
Coal capacity.....	16 tons

THE LIVING WAGE AND THE LIVING RATE*

BY THEODORE ROOSEVELT.

Recently certain railway men petitioned the Interstate Commerce Commission to be allowed to raise rates. It is announced that the Interstate Commerce Commission is to look into the case. This makes it opportune to say a word or two on the subject; for the ability of the honestly managed railways of the country to render good service to the public and to pay good wages to their employees ultimately depends upon there being a reasonable return to the honest investors, which means that the railways must possess a good earning power, which largely depends on the rates. The very big investor, like the very big shipper and the very high grade wage-worker, can usually get along somehow even under adverse conditions; but for the sake of the small or ordinary investor there is need of a living rate just as there is need of a living wage for the average workingman. The living wage and the living rate are interdependent.

There are railways which have been so foolishly or so corruptly organized and managed that it is impossible for investors in them to get adequate return for their investments; just as it would be impossible for them to do so if they had acted foolishly, or had been the victims of swindling, in connection with a dry goods store, or any other business enterprise. The public must not be expected to sacrifice its own interests and the interests of wage-workers in order to pay dividends on watered stock, or to secure promoters and managers against the consequences of their own folly. What I have to say does not concern railways of this stamp.

But it must be a cardinal principle in dealing with honestly built and wisely managed railways that the investor, the shareholder, is just as much entitled to protection as is the wage-worker, the shipper, or the representatives of the general public. Unless the investor finds that he is to get a fair return on his money, he will not invest, and in such case not only will no new railways be built but existing railways will not be able to repair the waste, the wear and tear, to which they are subject, and will not be able to make needed improvements. All governmental action, whether by the legislature or the executive, should be conditioned upon keeping in view this fact.

* In the *Outlook* July 5, 1913.

By actual experience it has been found that it is unsafe to leave the wage-worker, the shipper, and the general public, and furthermore that it is unsafe to leave the small investor himself, at the mercy of the big men who manage railways. But on certain points the interests of the big man and the small investor are identical. On certain other points the interests of both of them are identical with those of the wage-worker. On all points the only way of securing permanent justice to each class is by giving permanent justice to all classes. **The public can be well served, and the wage-workers can be well paid, only if the railway is successful;** that is, if there is such certainty of reasonable dividends as to make investors content, and therefore willing and desirous to invest in further developments and enterprises.

This is a sufficiently obvious fact, but it is a fact often in practice forgotten. In certain cases workmen's compensation laws and full crew bills are passed by legislatures at the same time that rates are reduced by commissions, or indeed sometimes by legislative enactment, until the property ceases to pay. Now a cardinal point made by all enlightened advocates of such laws as workmen's compensation and the like has always been that the burden is to be distributed through the corporation upon the public. Public service commissions are created for the very purpose of supervising, controlling, and regulating the activities of the railways so that they shall not only be obliged to treat their employees, the shareholders, and the general public fairly, but shall be guaranteed fair treatment themselves in return. Some railways are so remunerative that it is fair to reduce their rates at the same time that we increase their burdens. There are other railways as to which the only effective way to distribute the burden of payment for extra safety to employees and the public, and extra compensation to and care of the workers, is by rendering the service more remunerative; and this may of necessity mean raising rates. **It is just as much the duty of the Commission to permit rates to be raised when the raise is justifiable as to require them to be lowered if the lowering is justifiable.** The Commission is created precisely because this is the kind of work it can and ought to do, and the kind of work that no legislative body could with wisdom perform. **The Commission is no true servant of the public unless it unhesitatingly raises the rates when justice in the public interest requires such action, and unhesitatingly lowers the rates when this is the course which will ultimately best meet the public needs.**

This is merely part of the general doctrine of administrative con-

trol of big corporations. The control should not be hostile to the corporation; it should merely be hostile to any misconduct on the part of the corporation, and it should protect the corporation against misconduct aimed at it exactly as it protects others from misconduct committed by it. Unless the corporation makes money — that is, unless business men are prosperous — there will be no money to give in proper wages for the wage-worker, there will be no money with which to provide for his protection and to insure him against loss and damage, and no money wherewith to render proper service to the customers and to the public as a whole. Whether the reward comes in the way of big salary to the big manager who makes the business a success, or of dividends to the big or small man who invests money in it, the principle is the same. Our purpose is to see that there is a proper division of prosperity. **But there can be no division unless the prosperity is there to divide.** One of the methods by which the prosperity will certainly be abolished is to draw the line against size and efficiency instead of against misconduct. Another way to destroy it is to impose burdens, however necessary and proper, without facing the fact that some one must pay for the burdens, and that if the investor cannot pay for them and at the same time get a reasonable return on his investment, then either the business will close or the public must share the burden with the investor.

In the concrete case before us it is for the Commission to determine with strict justice to all parties how the relative and often conflicting demands of the shareholders, the wage-workers, the shippers, and the general public can properly be met. I am not discussing — I have not the knowledge which would warrant my discussing — whether the rates should be raised. If the facts do not warrant a raise, then the raise should not be permitted; but if justice and the interest of our people as a whole demand a raise in rates, then that raise in rates should unhesitatingly be authorized.

THE NECESSITIES OF A SUCCESSFUL RAILWAY

BY SAMUEL REA.

President of the Pennsylvania Railroad Company.

HIS TESTIMONY BEFORE THE INTERSTATE COMMERCE COMMISSION IN THE MATTER OF INCREASED FREIGHT RATES

In appealing to the Commission, on behalf of this Company and its System, for the moderate increase of rates covered by the application, I beg to state that I do so with a profound conviction, based upon an extensive railroad experience, that the application should be granted.

NECESSITY FOR RATE INCREASE.

This rate increase is required for the Pennsylvania System:—

1. Because the present rates do not yield a fair return on the amount invested in the railroad and equipment, and are not an adequate return for the services rendered and facilities provided for public use.

2. Because, despite the Company's utmost efforts to offset increasing costs by the application of the most modern operating methods, the return on its investment has been continuously falling, and unless this decline is arrested, it will undermine the Company's resources and cripple its power to satisfactorily serve the public.

3. Because the investing public, upon whom we depend for securing capital on reasonable terms, seeing the decline in profits, and in the return on the capital already invested, and being aware of the increases in wages, taxes and other items, and of expenditures of various kinds forced upon the railroads by legislative action, and the interest commanded by new capital, regards the situation with some concern and needs to be reassured that not only will our Company but the railway companies generally obtain reasonable compensation to offset the increase in expenses and the higher interest charges and enable them at least to maintain their current rates of dividend.

4. Because, at a time when capital everywhere is commanding a higher return than for many years past, it is necessary to earn expanding, not diminishing, profits, in order to obtain adequate capital

at fair interest rates as needed for new lines, equipment and facilities, so as not to stop the expansion of the country's traffic, which nearly doubles every decade.

THE PENNSYLVANIA SYSTEM.

The Pennsylvania System consists of many strong and weak lines, all feeding and supplementing each other, and a careful examination of the statements previously submitted to the Commission emphasizes the necessity for increased revenue for this System quite as much as for some of the less prosperous roads.

The Lines East and West of Pittsburgh embrace about 90 corporations with a road mileage of 10,818 and 24,194 miles of track, and total capitalization of over twelve hundred millions in the hands of the public, and with total operating revenues of \$382,000,000 per annum.

RELATION BETWEEN EARNINGS AND CAPITALIZATION.

Roundly \$1,000,000,000 of System capitalization is represented by Road and Equipment, as against about \$382,000,000 of System gross operating revenues, giving a ratio of approximately two and three-quarter dollars of capital for each dollar of earnings. The average ratio of capital to earnings on all American railways is about five to one, while on English railways it is ten to one.

The Pennsylvania System is very conservatively capitalized and the figures show that the failure to earn an adequate return is not due to excessive capitalization nor to a decrease in traffic, or revenues taken as a whole, but that freight is being carried at very low rates and net operating income is deficient, and in recent years this tendency is at work in an accelerating ratio.

The position of the Pennsylvania System is clearly revealed in the following brief digest:—

In ten years (June 30, 1903, to June 30, 1913):

Property investment in railroad and equipment has increased	530 millions
Operating Revenues increased	149 millions
Operating Expenses increased	129 millions
Net Operating Income (after paying taxes, rents, and equipment hire) increased	12 millions
or a return of only 2.23 per cent on the increased investment.	

In the last three years (1911-1912-1913):

Property investment in railroad and equipment has increased.....	207 millions
Operating Revenues increased.....	47 millions
Operating Expenses increased.....	54 millions
Net Operating Income (after paying taxes, rents and equipment hire) decreased	11 millions

Of this increase in property investment, amounting to 207 million dollars, 108 million dollars represents money spent in the construction of the New York tunnel and terminal improvement, which commenced in 1901; but as it was not completed and the lines embraced therein were not operated until near the close of 1910, there were no earnings to place against these expenditures, and, in accordance with the accounting practice of the Commission, the total investment was not included in Property Investment Accounts until the fiscal year ending June 30, 1911.

PHYSICAL CONDITIONS IN 1903 AND THE REMEDIES APPLIED

That these results demand serious and immediate consideration there can be no doubt.

Let me briefly state the conditions which confronted the Pennsylvania Railroad Company in 1903, the beginning of the ten-year period, which will illustrate the necessities for these large expenditures because on its main line the traffic of the System largely concentrates. In 1902 there was a remarkable development of business throughout the country, particularly in the section served by Pennsylvania Railroad Lines, and the demand for transportation could not be adequately supplied with the then existing facilities. The System East and West in 1902 had an increase of almost two billion ton miles of freight, which was about nine per cent, over the previous year, and the tonnage mileage aggregated almost twenty-four billion for the entire System. The industries depending on our lines demanded a much larger and quicker movement, but we were unable to properly accommodate the traffic, as the limit of the capacity of the running tracks and yards had been reached and overcrowding prevented a free movement. This was particularly true on the main line between Pittsburgh and Philadelphia, where the ton miles amounted to over eight and a half billion, while the density was almost seventeen million ton miles for every mile of road. Now this condition was

repugnant to the policy and practice of our Company; but it was not practicable, even by large expenditures, to at once create sufficient facilities to accommodate the exceptional growth of traffic.

After careful consideration the management decided that a series of exceptional improvements were absolutely essential to promptly and economically handle the present and prospective traffic and meet public requirements. These expenditures may be divided into three important classes:—

1. Relief lines for the principal purpose of enabling freight traffic to freely move day and night; the construction of additional running tracks; belt lines and cut-off lines to keep the through freight traffic off of the big cities, thereby avoiding terminal congestion and permitting the economical handling and growth of local traffic — freight and passenger; electrification of lines; automatic signaling; revision of lines by reducing the grades and eliminating curvature; track elevations to avoid grade crossings; new extensions and branches to open up the country and bring its natural resources to the markets.

2. New yards and freight and passenger stations; enlargement and improvement of existing yards and stations.

3. Additional equipment; steel cars for freight and passenger traffic; and more powerful locomotives.

For these purposes the Property Investment Account of the System, I have stated, increased in the last ten years, 530 millions; of this about 366 millions were provided out of new capital, and 164 millions out of surplus.

This expenditure on the System in this period was not for an expansion of its territory, but primarily for intensive development. The road mileage increased in the ten-year period only 3.9%, while the total mileage of all tracks and sidings in the same period increased from 19,659 to 24,194, or 23.1%. It is not difficult to describe in a few words the extensive improvements of this ten-year period, but it is more difficult to convey the underlying responsibility of obtaining capital and carrying out the work. For instance, railroad yards were reconstructed, enlarged and modernized; and equipment was increased by very many cars and locomotives, but I will illustrate their extensive character and essential importance to a System like ours. In the year 1913 over two million loaded and empty cars in through freight movement passed over the main line at Lewistown Junction; and in five of these freight yards alone the mileage is equal to a single track railroad from New York to Pittsburgh. So far as equipment is concerned, in this ten-year period the number of locomo-

tives increased 41.5%, while their tractive power increased 80%, or 99,521,170 additional tractive pounds; passenger cars, 33.5%, freight cars, 22.5%, and their tonnage capacity, 62.2%, sufficient for 4,600,-032 additional tons. The necessity and benefit of these large outlays to the railroad and to the public during that period have been proven, and half measures would not have cured the situation and enabled us to perform our full duty to the public in taking care of the increased traffic. Our average freight train load on the System in 1903 was 436 revenue tons, and in 1913 was 582 revenue tons, an increase of over 33%, and the average tonnage per loaded car rose from 21.14 tons to 25.71 tons. During the same period, 1903-1913, the freight traffic density increased 61.2%, and the revenue ton mileage increased 70.2%, but train mileage only 27.6%. If this economical handling of the traffic had not been effected, the Company's condition would have been serious, because the average revenue per ton per mile dropped from 6.42 mills to 6.06 mills, on the System.

This illustrates our efforts on the entire System, for during this period rising costs of all kinds had to be borne, making great inroads on our revenues, although every effort was made to control the situation and handle the traffic with dispatch and economy. The results are before you and are rather disappointing.

On the property investment of the entire System the net operating income produced 7.49% in 1903; 7.41% in 1910; and only 5.48% in 1913. If we add to the property investment the expenditures for additions and betterments provided out of surplus income from 1887, the System earned only 6.66% on its investment in railroad and equipment in 1903, and 4.78% in 1913.

CAUSES FOR PRESENT SITUATION.

This present situation is the result of factors, the more important of which the Company cannot change or modify, such as:—

1. Its inability in selling public transportation to obtain rates that would give it an adequate return upon the investment in railroad and equipment, or for the transportation service rendered and facilities provided.

2. Increased expenses (over many of which the Company has no control) caused by increased rates of pay of employes; increased taxes; legislation, both Federal and State, such as extra crew laws, hours of service laws, boiler inspection laws, workmen's compensation laws, etc. Other increased expenses result from the necessity of larger

and more expensive terminals and stations both for passenger and freight, steel cars in place of wooden cars, which in turn result in heavier and improved bridges, elimination of grade crossings, maintenance and operation of interlocking and automatic signals, more substantial standards of roadbed to carry the heavier equipment and heavier train and car loads, increased fuel, tie and other costs, and any advantage that may have accrued as the result of more substantial standards of roadbed, heavier car loads and train loads, has been more than offset by higher taxes, wages and other increasing costs, the end of which has not been reached.

In this ten-year period, we did not confine ourselves to large expenditures for improvements in providing tracks, equipment and facilities, but we put forth every effort for effective and economical operations and maintenance. This resulted in more costly maintenance, not only in wages but also in materials. The number and movement of more trains with the heavier engines, steel cars, heavier loads, required more vigilant supervision and a higher standard of maintenance; heavier and more costly bridges and bridge repairs and renewals; the 100-lb. rail had to be made the standard on all of our branch lines as well as the main line and we have seriously before us the desirability of a 125-lb. rail or heavier rails for the main lines; the number of ties per rail was increased; more tie plates and stronger fastenings are used; improved track drainage and foundation work, and greater depth of ballast, for the stability of the track structure was required; shop improvements and enlargement requiring more men and machinery for the quicker repair of larger and heavier equipment; the maintenance and use of extensive block and automatic signal systems. Every step was taken with regard to the maintenance of the track, equipment and service, to accord with the traditions of the Company for a safe standard of railroad, which in the end is the most economical. Nor has the Pennsylvania System tried to depart from its practice that the proper amount of working expenses and depreciation should be fairly and not excessively made within the ability of the Company's revenues and plainly reflected in its accounts.

THE PENNSYLVANIA RAILROAD COMPANY'S POSITION.

It may be urged, however, that the parent company (The Pennsylvania Railroad Company), on whose main and leased lines the traffic of the System converges, is assured of net operating income so large as not to require additional revenue.

I would not create the impression that a five per cent rate advance is necessary to the maintenance of the Pennsylvania Railroad Company's dividends in the immediate future, although, if it cannot be obtained, it may be necessary for the Company to curtail the necessary provision to preserve that high standard which the public has grown to expect from it. The facts, I believe, will show that the Pennsylvania Railroad is not earning an adequate or reasonable return on the actual money expended for its railroad and equipment, or for the value of the service rendered and the facilities furnished. Yet this Company is in a unique position: It runs directly across Central Pennsylvania, through a territory rich in natural resources and which prior to its construction had been opened as a trade route by private turnpikes, and by canals and railroads owned and operated by the State; its traffic is supplemented by the large tonnage and passenger business which it receives as an important link in the trans-continental railways systems of the country; its capital stock represents actual cash outlay and has not been watered; it has enjoyed a continuous conservative management by trained railroad men and Directors, who are residents of the State of Pennsylvania, experienced in commercial and financial matters and who give constant attention to its affairs; it has always applied to betterments a substantial portion of its earnings, instead of distributing all of them as dividends to its shareholders, a large percentage of whom are citizens of the State. Every effort had been made (the criticism of which we leave to the public) to maintain a reliable standard of public service, to conserve the property; to advance the welfare of the employes; to assure the support of the stockholders and bondholders in furnishing new capital on fair conditions; to add to the prosperity of the territory it serves; and to obtain the greatest efficiency in operation, not sporadically but continuously, in every department.

Any general idea that the Pennsylvania Railroad Company's position is so strong as not to need any additional revenue, is not correct, because only 4.84% was earned on the money invested in the railroad and equipment of the Pennsylvania Railroad Company and the Lines East of Pittsburgh directly operated by it during the year ended June 30th, 1913.

Therefore, had the Pennsylvania Railroad Company disbursed its entire surplus in dividends and issued stock or bonds for all additions and betterments instead of adhering to its policy and practice of providing some of them from income, the effect might readily be estimated: first, on the lower dividends it would be forced to pay,

and, secondly, the difficulty and increased cost of raising new capital.

But it is equitable to review the position of the stockholders under this policy, to ascertain whether they have received an undue return.

This Company has paid a return on the stock in every year since its incorporation, but in the past 36 years the cash dividends have never exceeded six per cent per annum, except in 1881, when 8 per cent was paid, and in 1882 and 1906, when 6½ per cent was paid, and in 1907 when 7 per cent was paid. Cash dividends since 1847 have averaged 6.01 per cent on par (\$50 per share).

CAPITAL STOCK SUBSCRIBED AT A PREMIUM.

In considering the return paid to the stockholders it must not be forgotten that the shareholders paid premiums on new stock issued, amounting in all to over \$43,000,000, and the entire amount of these premiums has been **used for capital purposes**. These premiums were at the rate of 20 per cent in 1901, and 20 per cent in 1903 on issues of new stock, while premiums on capital stock issued to retire convertible bonds dated 1902 and 1905 were at the rate of 40 per cent and 50 per cent respectively. Therefore, the total premiums used for capital purposes but not represented by any capital obligations, including premiums on stock sold in the market and stock issued in the acquisition of branch lines, aggregate in all \$43,000,000 as heretofore stated.

Further, the market price of our stock to-day is very little above par. Under the prevailing market price and dividends of 6 per cent per annum on par, shareholders who subscribed for stock at \$60 per share (120%) have sustained a loss on their investment, while those who subscribed to bonds converted into stock at \$70 per share (140%) and at \$75 (150%) have a much heavier loss.

Our Company is owned by over 89,000 stockholders, and the average holding is about 113 shares. Fully 48% of this number is made up of women, and two-thirds of the stockholders do not hold over \$2,500 each of stock.

Since 1907 our large body of stockholders have, like everybody else, had to face the higher cost of living, that is with the decreased purchasing power of the dividend. We have not been able to relieve them by any change in the rate of dividend, although it is recognized that some of them subscribed for the stock at 20 per cent above par

and their return is but 5 per cent per annum. The bondholders who converted their holdings into stock at 140% obtain a return of only 4.29%, while those who converted their bonds at the fixed rate of 150% receive only 4% per annum on their investment.

The stockholders have pursued a very liberal policy in using the surplus of past years for betterments and to maintain a high and safe standard of railroad service. We have raised and expended new capital only after careful consideration of each item, and in doing so have brought prosperity to the States and communities which we serve and to the country at large. But what is to be our policy in the future? The striking shrinkage of net operating income in recent years compels us to review and reconsider it; we cannot stand still; we must advance with a growing country for which there is yet much to be done, or go backwards. If the railroads are to be crippled, there is swept away very much of the economic foundation for national progress in the life of every citizen. We have no alternative but to apply for relief, not that we may continue to exist, but that we may secure a firm financial basis to perform, as we have done to the best of our ability in the past, our clear duty to the public, and to those to whom we must look to provide new capital in the future.

ADDITIONAL FACILITIES MUST BE FURNISHED IN ADVANCE OF ACTUAL NECESSITY.

Roughly, the traffic of the railroads of this country doubles every ten or twelve years. While this ratio may not hereafter be maintained, we know that the traffic will increase, and, therefore, that the facilities must be provided by the railroads to properly accommodate the business.

We also know that it is unwise and impossible to limit new facilities to actual and immediate necessities; that is to say, in passing from a single track railroad to a double track railroad, or from a double track railroad to a four track road, or from a four track road to a six track road, as in the case of the main line east of Pittsburgh, or in building new passenger stations, or laying out new freight terminals, we must provide for the future and plan for ten or more years ahead. Necessarily that involves a large expenditure of money that only gradually becomes productive. We know that judging from our past experience, many millions could be advantageously expended on the System in the next few years. We have confronting us a program of expenditures which we believe to be essential, some of them mainly

for the benefit of the public, but all of them necessary to properly accommodate the present and future traffic, such as continuing our program of building steel cars in place of wooden cars, automatic block signals, electrification of passenger terminals, like the city of Philadelphia, electrification for freight traffic to overcome the disadvantage of mountain grades and effect operating economies; the construction of additional running tracks and enlargement of yards for freight traffic; the building of new passenger and freight stations and the enlargement and improvement of existing terminals and stations, such as in the cities of Chicago, Philadelphia, Baltimore, and at other points, negotiations for which are now being carried on with the city authorities, all of which is in accordance with our practice of making adequate provision for all traffic. It is unwise, as well as unnecessary, to commit ourselves to any large fixed program of expenditures, except to say that without assurance of adequate earnings they cannot proceed, and a reasonable portion of the cost of these future enlargements and improvements ought in our judgment to be provided from surplus earnings.

MARGIN OVER DIVIDENDS ESSENTIAL.

We know it is essential for us to maintain adequate dividends as well as an adequate margin over the dividends if we are to obtain from the investing public the capital needed to provide the additional facilities essential to take care of the normal growth of traffic; and we must have some leeway against business depressions, which occur periodically, and for other extraordinary emergencies that arise.

Many of the contemplated improvements mean expenditures from which the railroad will get no immediate adequate return, but from which the public will benefit very largely. If our income is further curtailed, and the proportion thereof, which we are forced to pay for railroad operations and construction, and towards the support of communities, cities, states and the federal government, continues to increase as rapidly as within the past few years, these must first be cut from our program, because the other items, such as the building of additional tracks, rearrangement and enlargement of freight terminals, and equipment, are absolute essentials for railroad business, and must be done or the whole machine will be clogged. Now there are a number of railways, which through lack of money have been able to undertake only improvements of this latter class, and their net income consequently may not show a tendency so un-

satisfactory as that of the Pennsylvania System in the last few years. If the Pennsylvania Railroad were to confine its expenditures to facilities exclusively to make trains move on the rails and were not to consider improvements of public service, it could go on for some time without higher rates. But looking at the question broadly it is evident that without higher rates the Pennsylvania System cannot afford to continue as heretofore the policy of improvement involving non-revenue earning, or deferred revenue earning, facilities and accommodations. Moreover, if necessary improvements were delayed, capital would subsequently be needed in large sums to take care of the traffic and to meet the public demand for increased facilities. This delayed expenditure, then, in bulk, could not make good the restriction to trade and commerce caused by the failure to provide in advance for such traffic.

What is the conclusion to be drawn from all of this?

1. The margin of surplus is steadily diminishing, and the Company is not receiving any return either on the additional capital invested, or for the value of the service rendered and the facilities provided, for public use.

2. Had there been no surplus in earlier years, and had the whole of the improvements been paid for out of capital, the margin would now have reached the vanishing point.

3. If surplus steadily decreases, improvements, if made at all, will more and more need to be made out of new capital.

4. But if the margin of safety decreases, new capital will only be raised with greater difficulty and on more onerous terms.

5. Indeed, it is questionable whether, if new capital is to continue to earn no income, the Directors will be justified in attempting to raise more than a modicum of what they believe necessary, as the effect must be to reduce the percentage return on the shareholder's capital already invested.

PUBLIC INTEREST REQUIRES ALL RAILROADS TO EARN A REASONABLE RETURN.

In what I have said hitherto I have assumed that the Pennsylvania Railroad would, and ought to, continue its traditional policy of paying stable and reasonable dividends and putting back into the property a reasonable portion of its surplus for additional facilities and improvements for the public, but if we are to be prevented from securing reasonable rates, I am forced to deal with the question whether

that policy is still sound. The question must be faced from two points of view — that of the stockholders, and that of the public, including in the latter all dependent on the railroads for support as well as service. From the stockholders' point of view, I desire now to say that our present dividend, unless it is absolutely secure in good and bad years, is not a fully reasonable return to our shareholders. The fact that we have not paid to our shareholders many millions of dollars earned as a profit, at very low rates, which profit might without objection, either legal or moral, have been paid out as dividends, but instead have devoted this money very largely to the improvement of the public service, entitles us to make this claim. If we are allowed to earn a net income that will make our dividends safe beyond reasonable risk the Company will, I doubt not, continue its established policy of devoting a large portion of its surplus to improvements and the maintenance of a safe and high standard of transportation service. But if the security of our dividend is to be imperiled, we must do what we can to protect ourselves, and we shall be forced to seriously consider the propriety of insuring against a reduction of dividends in bad years by devoting in good years our additional earnings, not to the improvement of property devoted irrevocably to public service, but to a reserve dividend fund for our shareholders. The policy of capitalizing all improvements, betterments and additions was pursued for many years by the leading English railways, with the result that the financial position of English railway companies became unsatisfactory from the point of view both of the public and the shareholders. This policy also governed the main features of the financial conduct of the Prussian railways. In speaking before the Prussian House of Peers on May 30th, 1910, Herr von Gwinner, Senior Manager of Der Deutsche Bank, referring to this policy on the part of the German government, made this remark, which applies with equal force to all conservatively financed railroads: "If the Pennsylvania Railroad Company were financially administered in the same manner as our government railways, its shares would constitute the most speculative investment on earth; in one year they would pay two per cent dividends, in the next year, perhaps seven per cent; whereas, a well-administered undertaking like this company is trying to offer permanently stable dividends."

It is wholly in the interest of the public that a railroad should always be in a financial position strong enough to increase its facilities and equipment to properly accommodate its traffic, prospective as well as present. Can it be fairly contended in the best public interest

that all of its betterments and improvements, even when non-revenue producing, should be provided out of new capital, and that it should not be permitted to earn any surplus income to devote to this purpose? The experiences of roads in this country and abroad show that, if a road, however strong, makes all the improvements from the proceeds of stock and bonds, the time may come when it must reduce or discontinue its dividends, and it cannot raise capital for necessary extensions and additions. Even assuming that it obtained permission, when that time came, to increase its capital and to raise its rates, if it needed to do so to pay interest on such expenditures, it would by no means follow either that the increase of rates would produce the additional net revenue required, or that the money market would be able and willing to furnish new capital which could not offer the prospect of earning a direct return.

Experience indicates that the practice of putting back into the property the surplus beyond a reasonable dividend is in the interest, not only of the shareholders, who thereby tend to insure the permanence of their dividend, but also of the public, who thereby insure the continuance of the provision of adequate facilities, even where they are not directly dividend earning. Is not the policy of betterments from income at least more in the public interest than dividing the entire net profits?

In all of this it should be recalled that while improvements and betterments made out of surplus income become the property of the shareholders, they are property dedicated to a public use, and as such subject to public regulation, and only by the pursuit of this policy for over fifty years has the Pennsylvania Railroad Company been able to maintain its dividends, and its surplus is not excessive.

CONCLUSION.

In concluding, may I say on behalf of the Pennsylvania System that we do not want the Commission to feel that we would join in requesting either an increase of rates not urgently required, or an increase in rates that were already high compared with other lines on this continent or abroad, or that were not immediately justified. The railroads have, by the progress of the country, by improved management and continued efforts for better operating traffic and financial results, and by the assistance of the Interstate Commerce Commission, emerged from the very weak position they occupied in 1898, and obtained a very low average revenue per ton per mile above the

danger line, which, with the country's growth, has kept many railroads from failure. The increase now sought would only moderately improve that average revenue and would partially meet the higher costs sustained by the roads. If the freight revenues of the Pennsylvania System in 1913 had been 5 per cent greater, the net operating revenue would have produced a return on the cost of the railroad and equipment of 6.42 per cent, instead of 5.48 per cent. In 1910 we felt that conditions justified an increase, but with improving gross earnings and the better outlook for the railroads generally then existing it did not so impress the Commission, nor was the public prepared for it. Now conditions are worse; our expenditures have since then been larger, our costs higher; no return on many of our lines has been earned, and on almost all of them the return has been inadequate; with a return of only 2.23% earned on the increased investment in road and equipment in the ten years ending June 30, 1913; with a substantial decrease in net operating income for the three years ending 1913, and the falling off in revenues without any abatement in taxes, wages and other items since June 30, 1913, the outlook is far from satisfactory. Now we have as much public support as can possibly be given to a plea almost national in its scope and effect, and we firmly believe our application for a very moderate freight rate increase is in accord with the best public interest.

I therefore desire to say that we have put before the Commission the position of the Pennsylvania Railroad System. That it discloses a distinct trend downwards, which recently has become very rapid, will not be disputed. Our position is not so strong as it was. We have in more prosperous times given to the public a good share in our prosperity. We desire to continue to live up to a high standard of public service, but whether we can do so or not depends on the decision of this Commission. Without fair returns from reasonable rates we cannot induce the public to furnish adequate capital for the public requirements along our System, except at high interest rates. Unless the gap between receipts and expenditures can be widened, we must begin to retrench, and retrenchment must begin on betterments and improvements not directly necessary to the movement of trains. We should be very reluctant to do this, as it would be to run counter to our traditions and practice of half a century, and we are sure that it would not be in the public interest, and we do not believe the public desires it. We therefore respectfully request the Commission to grant the increase of rates for which application has been made.

WHY RAILWAY MAINTENANCE COSTS MORE

BY J. G. RODGERS.

General Superintendent Northern Division Pennsylvania Railroad.*

Charges to operating expenses on the Pennsylvania System east of Pittsburgh were \$24,855,624 in 1910 and \$29,411,210 in 1913 — an increase of 18.3 per cent.

The maintenance of way expenses for 1913 are necessarily much larger than they have been in the past and will undoubtedly continue to be at least on the present level in the future, due to the following causes:

1. The large increase in wages which has already been made.

2. That in view of the policy of commissions and the demands of the public, a much higher standard of maintenance must be observed than in the past.

3. That in past years the standard, quality, durability and strength of the roadbed and track structure has not kept pace with the increase in the weight of locomotives and steel cars, but the improvements that have been made looking toward this end have made the track a much larger and more expensive structure than it was some years ago and, therefore, it costs more to renew the different parts thereof.

4. That the policy of eliminating grade crossings, installing interlocking and automatic signals, straightening line, etc., in which respect there is still a great deal to be done, and which will continue as far into the future as we can foresee, involves heavy charges for replacement in kind of plant retired, and the structures which are built to eliminate grade crossings, consisting as they do of embankments, tunnels and bridges, will require much more to be spent upon them in the way of maintenance than the ordinary running track that heretofore existed.

Thus, of the total increase in maintenance of way and structures expenditures, 1913 over 1910, of \$4,555,586 there are accounted for:

* Substance of testimony before the Interstate Commerce Commission in the increased freight rates hearing.

1. Mileage maintained.....	\$1,089,059
2. Rate of wages paid.....	633,760
3. Number of men employed.....	283,721
4. Prices of materials used.....	607,603
5. Miscellaneous repair items.....	7,624
6. Amounts charged to expenses as replacements in kind in connection with elimination of grade crossings, installation of interlocking and automatic signals, changes of grade and line, etc.	2,162,964
Total.....	<hr/> \$4,784,731

INCREASING COSTS.

Mr. Rodgers gave certain concrete illustrations of increased costs, as follows:

The average distributing point price of rail has advanced from \$28.87 in 1910 to \$30.88 in 1913, an increase of \$2.01 per ton, or 7 per cent., due to a greater proportion of open-hearth than Bessemer steel used to secure increased safety during the latter year.

The average price of all ties used for repairs increased from 76.6c. to 84.5c. at the distributing point. This is due largely to the increased use of creosoted soft-wood ties made necessary by the scarcity of hard-wood ties. Creosoted ties have been used since 1909 only; in 1910, 17,598, and in 1913, 1,102,886 creosoted ties were put in.

The depth of ballast in 1909 was from 8 to 12 inches, and the standard has now been established as 18 inches. While the first cost of the increased depth is chargeable to additions and betterments, operating expenses are increased by the renewal of cinder, gravel and slag ballast placed under track a few years ago and will increase as the additional stone ballast wears out.

The number of ties used per mile has been increased in order to strengthen track for use of heavier equipment; prior to 1909 the number of ties to a 33-foot rail was 16, or 2560 per mile; in 1909 this was increased to 18, or 2880 per mile, to comply with which policy additional ties per rail have been put in as rapidly as possible.

The total number of tons of rail used for renewals in 1913 was 77,094 as compared with 95,808 tons in 1910. There were 3023 miles of 100-pound rail in main track in 1910, or 37 per cent of the total, and in 1913, 3534 miles, or 43 per cent of the total. There were 3904 miles of 85-pound rail in main track in 1910, or 48 per cent of the total, and in 1913, 3825 miles, or 46 per cent of the total.

Eighty-five-pound section was adopted as standard in 1887, and 100-pound rail for main line passenger tracks in 1892.

As was the case in some other instances, renewals of rails in 1908

and 1909 were low, which made it necessary to use larger amounts in 1910. The consumption in the latter year, therefore, was considerably higher than the average, while that for 1913 was about normal, based upon the average for the past five years.

In the endeavor to promote the safety of the traveling public in every possible direction, special attention was given to the rock cuts between Philadelphia and Pittsburgh and overhanging rocks were removed, at a cost of \$72,852.

Renewing linings of tunnels on the Western Pennsylvania Division and maintaining an improved ventilation system at Baltimore entailed an increased expenditure of \$29,032.

* * *

"SAFETY" COSTS MORE.

"Safety work"—signs and signals at crossings, heavier repairs to road crossings and fences — together with the construction of a large amount of improved fence in New Jersey, represented an increase of \$36,206.

The signal system has been greatly extended during this period, all passenger tracks having been put under absolute block system in 1912, in addition to which there has been a large extension of the automatic signals in place of manual block signals, and revisions of interlocking in connection therewith.

In 1910 there were 395 miles of automatic signals and 3209 miles of manual block signals; in 1913 there were 690 miles of automatic signals and 3926 miles of manual block signals. These changes must continue, resulting in increased charges to expenses for replacements in kind as shown above, as well as in the increased cost of maintenance.

WHY MAINTENANCE OF ROLLING STOCK COST MORE

BY J. T. WALLIS.

General Superintendent of Motive Power of the Pennsylvania Railroad
Company.*

The Pennsylvania System paid out \$72,971,585 for maintenance of equipment in 1913 as compared with \$58,197,036 in 1910 — an increase of 25.30 per cent.

The Pennsylvania Railroad east of Pittsburg had 4,242 locomotives on June 30, 1913, against 4,067 on June 30, 1910. Average tractive power in 1913 was 32,776 pounds against 31,013 pounds in 1910. Total locomotive miles were 128,334,119 in 1913 and 117,010,—549 in 1910.

The cost of locomotive repairs on the Pennsylvania Railroad lines east of Pittsburg for the year ended June 30, 1910, was \$11,597,406. The cost of locomotive repairs for the year ended June 30, 1913, was \$15,267,832, an increase of \$3,670,426, or 31.7 per cent.

It costs proportionately more money to maintain a large locomotive than a small one, and the repairs of any given size locomotives will vary with the number of miles that the locomotive is run, namely, its use. It is accordingly proper to base comparison of the cost of locomotive repairs on tractive power miles, which are arrived at by multiplying the mileage of every locomotive in service by its tractive power.

Of the total increase of \$3,670,426 in locomotive repairs, \$1,129,—940 is accounted for by increased rates of pay and by expenditures to meet changed conditions, and \$1,843,988 as a result of increase in tractive power miles.

The cost of locomotive repairs to-day bears a proper relation to the class of locomotives that are being maintained when due consideration has been given to the general increases and various adjustments in wages that have been made since the adoption of locomotives of the type used to-day.

Repairs of freight cars cost the Pennsylvania System \$24,121,049

* Substance of testimony before the Interstate Commerce Commission in the increased freight rates hearing.

in 1913 as compared with \$18,281,364 in 1910. There were 268,364 cars the former year against 249,788 in 1910.

Of the total sum of \$5,839,685 increased charges to repairs of freight cars, there is due to an increase in total freight car mileage \$2,175,482. The increase in wages previously referred to in connection with locomotives caused an increase of \$572,802. Expenditures rendered necessary by the standardization of equipment law accounted for a further sum of \$1,190,054.

The remaining amount of \$1,901,347 is due, first, to an increase in the price of yellow pine and oak used in repairs of wooden cars, and, second, to the increase in the capacity of the modern car.

WHY REPAIRS COST MORE.

The character of the cars that are being constructed to-day is different from what it was ten years ago. Steel cars are coming in for heavy repairs, and the situation is gradually adjusting itself, but we will not have complete data as to the cost of repairs to such cars until a greater proportion of the steel cars have been passed through the shop for heavy repairs, and probably not until some of them, at least, have been discarded on account of decay, at which time an average figure for the repair of steel cars can be arrived at, but this is not possible to-day.

The cost of repairs to freight cars per million capacity ton miles has decreased each year as compared with the year 1903, this decrease for 1909 being 22.6 per cent. Since that time the decrease has not been so great, due to the fact that there was an increase in wages and added expenditure in connection with the standardization of equipment law. In the year 1913 there was a decrease of 17.4 per cent in the cost of repairs per million capacity ton miles under the cost of 1903. If the charges for the standardization of equipment law and the increase in wages were eliminated, the cost per million carrying capacity miles would have been .00069 as compared with .00093 in 1903, or a decrease of 26 per cent. In other words, it is quite plain that the cost of car repairs per unit of capacity available for loading is decreasing, if other varying factors, such as increases in wages and charges for standardization of equipment, are eliminated.

The cost of repairs to passenger equipment cars for the year ended June 30, 1910, was \$2,681,753, and for the year ended June 30, 1913, \$3,176,707, an increase of \$494,954, or 18.4 per cent.

Of this, 6.6 per cent, or \$175,006, is due to an increase in car

mileage. An increase in wages heretofore referred to accounts for an additional amount of \$75,781, or 2.8 per cent.

In 1908 we received our first steel passenger equipment cars. On January 1, 1914, we had a total of 1,742 steel passenger cars in steam service, 84 steel cars in electric service, and 2,209 wooden cars. The wooden cars have been rapidly going out of service and the steel cars have been replacing them. The rate of replacement has been very rapid, in fact, much faster than the replacement of wooden cars prior to the adoption of the steel car. During the first few years that the steel cars came to us, they required comparatively little attention, and in our effort to utilize our steel passenger equipment cars to the very best advantage and to make steel cars cover a maximum number of trains so that the public might have the maximum benefit therefrom, we kept our steel passenger equipment cars out of the shop and did but comparatively little work on them until within the last two years, when it became necessary to take them in and do more work to prevent deterioration.

RENEWALS AND DEPRECIATION OF EQUIPMENT.

At the present time the Pennsylvania Railroad Company charges depreciation on the following bases: Locomotives and passenger cars on a basis of 4 per cent of the original cost of the equipment, and on freight cars on a basis of 3 per cent on such cost for the reason that, we believe a locomotive will last about twenty years, and based on the final value of the scrap being 20 per cent of the original value, the depreciation plus the salvage will equal the original cost. On passenger cars we believe that our wooden cars will last twenty years. As far as steel cars are concerned, we do not know how long they will last, but in order to provide for the replacing of our wooden with steel cars in a reasonable time, and for the steel cars when they shall have to be retired, the best figure we have been able to arrive at is 4 per cent.

CERTAIN CONSIDERATIONS IN RAILWAY RATE-MAKING

BY BALTHASAR H. MEYER.

Member of the Interstate Commerce Commission.*

I believe it is possible to approximate a standard in rate-making much more than has been done in this country in the past, but the kaleidoscopic nature of the facts which enter into a particular rate problem will probably always defeat every attempt to impose a uniform rate rule upon the traffic of to-day throughout the United States. Were we standing at the threshold of the industrial epoch which brought the railway and modern manufactures with none of the industrial relations of the contemporary structure of society established, a very different problem and, consequently, also a very different solution, would be presented. The standard which I expect to see develop more rapidly in the future than in the past is a certain approximate standard applicable to normal or typical conditions from which variations will be made in the light of the concrete facts in each particular case.

THE RATE PROBLEM PERPETUAL.

This is not the first time that the Economic Association has devoted a part of its meeting to a discussion of railway questions, as an examination of past programs will attest. In all probability, it will not be the last, for the question of railway rates embraces elements which are perpetual and which doubtless inhere in every industrial society which employs the railway as one of its instrumentalities. As long as rival individuals engage in trade, offering the same or competing commodities, placed upon the market by competing producers and sought by rival consumers, and any or all of these believe transportation charges to be excessive or discriminatory, the railway rate problem will continue to exist. The present system of private ownership and systems of regulation may give way to different systems of regulation, and these in turn may be superseded by a system of public ownership; but none of these will terminate rate controversies. Changes in ownership and systems of regulation and administration

* From a paper before the American Economic Association, Minneapolis, Minn., December 29, 1913.

may eliminate some rate questions; they will with certainty originate others, and the rule or rules which suggest settlements to-day may have to give way to other rules which the conditions of the future may require. The doctrine of relativity applies also to transportation.

RAILWAY RATES AND IMPORT DUTIES.

In dealing with railway rates we come in contact with nation-wide interests and forces, and, indirectly, and perhaps involuntarily, also with international forces. Under the law our appointed jurisdiction in the United States may stop with ocean, gulf and the 49th parallel; the economic effect of our action often goes far beyond. Considerations of this kind have led those foreign countries in which the railways are publicly owned to view their respective industrial policies as a united whole, of which the railway is a part. The administration of the railway is there made an instrument in shaping commercial policy. Railway rates and customs duties are frequently treated together, and rate-making is conducted in harmony with the customs policy of the country. In the United States, customs duties and railway rates have as a matter of law always been strictly divorced. Whether railways will be permitted in the future through the rates of transportation which they prescribe to augment or diminish the rate of import duty imposed by the federal government, only the future can reveal. It will probably depend upon the wisdom and discretion with which the power of making railway rates will be exercised in this respect.

COMPARATIVE RATES.

It has long been customary to establish rates in the light of certain checks and comparisons. This has apparently been done on the theory that if numerous other rates can be cited which are applicable on the same or similar traffic, under substantially similar circumstances and conditions, a rate in harmony with such illustrations is likely to be just and reasonable. Comparisons of this kind when restricted to small areas, such as a single state, are rarely satisfactory, but when they extend over a number of states, or embrace the entire United States, including numerous rates which are the result of competition between carriers, water and rail, while not necessarily determinative, are nevertheless of sufficient interest and value to command respectful consideration if not confidence. In the absence of better

measures and checks this is one of the most useful expedients. Its intrinsic value depends, of course, upon the manner in which the rates drawn into the comparison have been selected, and the influences and forces which united in originally establishing them.

COMPETITION IN RATE-MAKING.

This suggests the element of competition as one of the considerations in the making of railway rates. The members of the economic association are so thoroughly familiar with the general aspects of this feature of our problem that I shall not devote any time to it. There are survivals of the competitive rate, but the merest novice in the railway history of the leading countries of the world knows that competition alone has nowhere permanently secured to the public reasonably adequate service at reasonable rates, and that in consequence practically the world over the competitive theory of railway rate-making has been abandoned. Where it does bring benefits to the public, competition is capable of producing better results than the best regulation. To what extent competition survives in railway rates or service to-day, and what benefit the public may derive from it, lies outside of the scope of this paper.

VALUATION AND SECURITIES.

Perhaps the most important single factor, now unknown, which will enter into the consideration of railway rates in the future is that of the value of the property. Theoretically, it has long been considered by commissions and courts, but in practice its application has been limited to isolated valuations or partial valuations made under different, if not mutually exclusive methods, varying in degree of thoroughness and applied almost exclusively to meet allegations of confiscation of property. In the not distant future we may hope to know what the fair value or final value of our railway properties is, whatever these terms may be made to include. In the past, attempt has been made to appeal to the volume and market value of outstanding securities with the view of having them considered as evidence of value to support a rate or rate structure under attack. In the future, after the valuations have been made, similar appeals can have little weight. Once the value of railway property has been officially established, and power to regulate service and rates co-extensive with the railway business lodged with competent administrative authority,

the issuance of securities by railway corporations becomes a question of public morals. The public eye should be directed toward the value of railway property as determined under the valuation statute rather than to the market value, face value and number of pieces of paper which may have been circulated to represent the property. If there are people who prefer many pieces of paper, each with a smaller value, to fewer pieces of paper, each with a larger value, we may well permit them to gratify their whim, provided no burden is thereby imposed upon the rate-paying public. As a matter of good morals we should prohibit as far as possible and make difficult the circulation of bad securities. We should legislate against the exploitation of the undiscriminating public when its speculative traits are appealed to, but under no circumstances should we recognize these engraved pieces of paper as the equivalent of property in the making of railway rates, or perchance, validate them through ill advised stock and bond legislation. The country urgently needs stock and bond legislation; but **it will be better to have none than accept much of what is being proposed.** What consideration, if any, should be given to securities issued in the past by railway companies in the valuation required to be made under the valuation act, is a matter which I cannot discuss with propriety at this time, and regarding which I shall express no opinion; nor should anything which I have said herein be construed as an intimation of what I believe the final conclusion upon this question ought to be. But what I am free to say is, that the task of valuation having been accomplished, outstanding securities against the valued property should not receive the least consideration in the establishment of rates to be collected for the public use of that property. As suggested before, with adequate legal provisions and effective administration covering value of the property, service, and rates, **the public has no interest in railway securities except as a matter of morals.** These moral purposes should be promoted and achieved to the fullest extent possible through legislation, but great care must be exercised lest this legislation may by inadvertence or design make the value of securities a basis for rates with the possible consequence of imposing untold and utterly needless financial burdens upon the present and future generations of rate-payers.

COST OF THE SERVICE.

A second factor equally fundamental with the value-of-the-property factor, which I believe will be employed very much more

in the future, is that of the cost of service. A great variety of statistical analyses have heretofore been made, but systematic efforts directed toward the ascertainment of the approximate cost of the service have, generally speaking, been strangely neglected. A small minority among those dealing with rate problems have long advocated it, but their plans have been thwarted by the skepticism and unwillingness of a persistent majority. There are those who have opposed the development of statistical investigations along the lines of cost because they assert the results are bound to be misleading and unreliable. Others confess a fear that information of that kind will be misused. Others declare that it will result in the establishment of rigid distance tariffs, with attendant chaos in the industrial world. Still others maintain the view that the cost of the service has nothing to do with the rate either in general or in particular. The combined weight and influence of all these objectors has thus far been sufficient to obstruct substantial progress.

GROWTH OF COST ACCOUNTING.

It is a fact of common knowledge that so-called cost accounting has been applied to every important branch of industry except steam railway transportation. A prolific literature upon the subject has been produced within the last decade, and competent specialists in all branches of business are prepared to give these principles practical application. The railways themselves have made limited application of the principles of cost accounting to more than one half of the railway mileage in the United States. They declare, however, that this has been done for internal corporate administrative purposes rather than with a view of assisting in the establishment of just and reasonable rates. The difficulties of separating operating expenses among the various branches of the railway business are as apparent as the benefits of the final results are clear to those who are willing to undertake the task. It is perfectly obvious that controversy respecting the apportionment of maintenance of way items, for instance, can never end. Is this, however, sufficient reason for refraining from undertaking a work which is so promising in beneficial results? There exists surprising similarity in the methods employed by different railway companies in apportioning certain common or overhead expenses. This similarity appears to have been brought about without previous conference and agreement and is apparently the result of similar conclusions arrived at by men working at the same problem

independently of one another. However, I am not suggesting that methods and rules which are now found to be common to several railway accounting departments are necessarily those which commissions should accept or prescribe. If cost accounting is not to be applied to railway transportation until every refinement has been settled by unanimous consent of the accountants, we shall never get anywhere. Institutional reforms are rarely effected from within and the railway is no exception. If such a rule were to be applied to the assessment and collection of taxes the government of every civilized country in the world would be obliged to cease its activities for want of revenue.

PRACTICAL APPLICATION.

A new system of express rates is about to be put into effect throughout the United States. It inaugurates a revolution in the conduct of the express business. It is a carefully considered experiment, the exact outcome of which no one can predict with full confidence. How will anyone be able to draw a conclusion at the expiration of a definite period of time regarding the financial results of the operation of the express companies without approximating a segregation of the expenses incurred by the railroads on account of the express business? Railway mail pay is the object of periodical controversy. Does not that involve essentially the same fundamental accounting questions? Passenger rates are an issue in different states in various parts of the country. How can these controversies be properly and justly settled without some reference to the cost of conducting the passenger business? One might suppose that the railways in this country would fairly vie with one another in producing the most scientific cost data in regard to their respective operations which the best talent can compile. With a few conspicuous exceptions, the exact contrary is the fact.

JOINT COSTS, ECONOMY AND EFFICIENCY.

Before I leave the subject of cost of service, kindly permit me to remind you of the impossibility of commenting upon such extremely important phases of the issues as are suggested by the words by-products and joint costs, which have been so ably treated by distinguished members of this association. I must deny myself the pleasure of reviewing their work.

Furthermore, I have commented upon the cost of service as a

consideration in rate-making only. This entire paper might advantageously have been devoted to railway cost accounting as a test of efficiency and economy in operation; and after it has been ascertained what it actually costs to operate a railroad, a further inquiry into what it should cost to operate may profitably be instituted.

CONTROVERSY AN OLD ONE.

This whole controversy regarding the cost of the service is as old as the railway itself. Any method of separating expenses which may be adopted will at best have much room for honest differences of opinion and the employment of varying, arbitrary factors. To my mind this situation resolves itself ultimately into the fundamental proposition that cost, being one of the elements to be considered in testing the reasonableness of a rate, must be ascertained as accurately as the nature of the problem will permit, otherwise it cannot be considered. How can anyone give consideration to costs unless he knows what they are? Concluding that we must arrive at costs, it devolves upon reasonable men to elaborate workable rules and methods and employ the results with a full consciousness of the limitations. After the value of the property has been established, the cost of conducting the business approximated, **and the value of the service considered,*** there will still remain a wide zone within which to exercise "the flexible limits of judgment."

PUBLIC POLICY.

This leads me to remark briefly regarding a third fundamental factor which is influential in locating the point representing the rate within the zone of reasonableness; namely, that of public policy. The only public policy which the administrative branch of the government can officially know is the policy declared by the legislative branch through its statutory enactments. Legislatures set up the standards in accordance with which administrative bodies must measure rates; and regulative statutes generally leave ample room for the exercise of wise discretion. The public policy thus prescribed is expressed in most general terms, leaving the detailed applications to administrative action and judgment. It is not this kind of public policy which,

*This is more essential in fixing a reasonable rate than finding the cost of transportation which might be the same for a bushel of pearls or a bushel of potatoes. S. T.

if my impressions are correct, people have in mind when they assert that the making of railway rates has nothing to do with the cost of the service, but that it is entirely a matter of public policy. I think that generally this statement emanates from the idea that rates are to be established at any particular time solely in the light of the available surplus of the railway corporation upon which the rate is to be imposed and the judgment or feeling of the rate-maker regarding the real or supposed needs of different patrons or classes of patrons. If this is the proper basis for the making of rates the statistical analyses to which I have referred above are superfluous and should not be undertaken. All that is necessary under the operations of that kind of a public-policy system of rate-making is a balance sheet and an eye on the next election. It is ascertained how much money the railway company can spare according to its balance sheet, and then it is a matter of "policy" who shall get the benefit of the reduction or bear the burden of an advance.

RATES IN POLITICS.

Nor is such a theory and practice of rate-making without merit. An organization of society is conceivable in which it would be the very best system. It would be a perfect fit in an ideal society constructed upon this theory. In a patriarchal organization of society it might be the only proper system, for the patriarch would be presumed to know from whom to take and to whom to give. Our present organization does not represent this type of society. An attempt to impose such a theory upon a democratic organization of society must inevitably result in throwing the entire question of railway rates into politics. It will then be largely, if not entirely, a question of clamor as to whether passengers shall ride at the expense of freight, whether wheat shall have the preference over cotton, live stock over lumber, coal over ore, vegetables over fruit, sugar over potatoes, rice over corn, etc. Obviously under such a system the available surplus will be dispersed — perhaps I should say, disbursed — in the direction of the loudest clamor and the largest vote. In a country like Prussia with its magnificent administrative traditions and machinery and far-sighted commercial and traffic statesmanship, an application of the patriarchal principle seems more readily conceivable, but even there rates are not made in just that way. While under a system of state ownership like the Prussian public policy in any proper sense of the term may exert itself more directly and more liberally, this policy

is certain to meet shipwreck anywhere if it does not embrace approximations of standards with which to test that policy from the point of view of railway operation. In other words, public policy is a framework, a background, interpretive in character, which should act as a guide in the application of more definite working rules in rate-making.

DIRECTING RATE DEVELOPMENT.

There have been developed in the United States systems of rates with blankets covering two thirds of the entire continent. Attempts have been made to break up these vast blankets, against which both common sense and reason instinctively rebel. But what is the standard toward which this breaking-up process is to be directed? Inordinately large groups have come into existence. If these are to be modified, by what measure is it to be done? The equalization theory of establishing rates for basal industries has been condemned. Along what lines are the new rates to be developed? The work of transforming these and other similarly indefensible features of rate-making of the past to which reference has just been made all point in the direction of greater consideration for distance in future rate-making. Transportation overcomes distance. Distance means expense. Shall distance have no weight in the establishment of the charge for that transportation? While no one who is at all familiar with the rates now in effect throughout the United States could for a moment reasonably consider the rigid application of a distance tariff to all traffic, it is equally apparent that many peculiarly knotty complications and controversies have already been settled through the application of a distance tariff, and that many more await a similar treatment in the future. This being so, we find herein still another urgent reason for aggressively pushing investigations into the cost of the service.

OTHER CONSIDERATIONS.

The time limits wisely imposed by the economic association upon papers of this kind permit of reference only, without discussion, to the relation of freight rates to the classification of freight. The so-called elements of classification have been enumerated and discussed in numerous decisions readily available to all. From the standpoint of cost of service, classification resolves itself largely into ascertaining transportation costs and insurance risks. Instead of emphasizing the volume of traffic, it lays stress upon the balance of the volume of

traffic in opposite directions. It inquires persistently into the utilization of car space and demands upon terminal facilities and generally acts as a unifying agent along defensible lines in the slow movement towards a uniform classification.

VALUE OF THE SERVICE.

That indefinite term "value of the service" must also be separately named. "Classification" and "public policy" absorb the most of its content and "what the traffic will bear" may act as residual claimant. Those who are to follow me may attempt answers to questions relating to the value of service, to whom? for whom? for what?

WHY A RATE YARDSTICK CANNOT BE DELIVERED.

If I have succeeded in pointing out "certain considerations in railway rate-making" they are the value of the property implying a fair return thereon, the cost of the service and a sound public policy, each to be applied and interpreted in the light of the others and of all other considerations whatsoever, through the exercise of a wise discretion in arriving at a judgment with respect to a particular statement of fact. The value of the property may be expressed in dollars in advance of any rate controversy. The rate of return may conceivably be established by fixed rules. The cost of the service may be approximated for any period of time and as of any date. Public policy may be outlined in general and specific language in legislative acts without reference to particular disputes. All the other considerations in rate-making may be indexed and catalogued for handy reference. But **no one can state in advance the specific facts in a rate problem or controversy and the attendant circumstances and conditions.** A certain combination of facts may require the application of a certain standard. A combination of facts similar to these but in different proportions may require a somewhat different standard. Instead of searching for one standard a set of standards may be sought, and that standard or combination of standards employed in each particular case which is best adapted to promote justice to all parties in interest. It is more important that justice shall be achieved in a large way than that some specific standard shall be promulgated and adhered to under all circumstances. That is why I cannot give you a universal rate yardstick, but must content myself with directing attention to a few of its fundamental components.

LOOKING THE FACTS IN THE FACE

BY A NEBRASKA FARMER.*

To begin with, I do not own a single share of stock in any public service corporation, nor in any other kind of a corporation. My only dealings with railroads is to pay for my railroad tickets or pay my freight bills when they are presented. I have not studied deeply into those questions which most men find so easy to discuss, and which a few men receive big salaries for knowing a lot about and not saying much. I am just a plain citizen of the middle West, now past the three-score year mark, and forty-seven of those years have been spent in Nebraska. There was not a mile of railroad in Nebraska when I landed here, the telephone was an eventuality of future time, as was the electric car, power transmission over wires, and a lot of other things. I have watched Nebraska grow from practically nothing to her present proud position among the states, and I have tried to perform faithfully and well the humble part given me in performing what has been performed. During all these years I have tried to the best of my ability, mentally and industrially, to keep up with the times, and to keep myself fairly well informed. My library is, I believe, better than that of the average man of my age, and I believe I subscribe for more magazines and newspapers than ninety-nine men out of a hundred.

I am laying no claim to more knowledge of public questions than most men, but believe I am safe in saying that I know as much about them as the average man, and more than some men whose mental ability is in inverse ratio to their vocal capacity. I never helped to make a railroad tariff sheet, I know nothing about the intricacies of rate-making, and my ideas of what constitutes a "reasonable return" upon money invested may not square with yours.

It may be that freight rates, and telephone rates, and electric light and power rates are too high. It may be that the stock in our big public service corporations has been irrigated until it is all waterlogged. Indeed, I believe that the rates are too high, and that we are being compelled to pay dividends on watered stock. I have nothing to base this belief upon save a sort of undefinable impression. I do not know how much it costs to build a railroad, nor how much it

* From "The Midwest."

costs to operate one, nor how much it costs to maintain one; therefore I do not know where I should begin were I called upon to make up a freight tariff in order to provide for all these contingencies. Other men who have had no better opportunities than I for acquiring this knowledge may know all about it, and be thoroughly competent to tell just what the rates should be, but I confess that I am not. All I know is what I have learned by experience, and experience has taught me quite a few things. Some men who are picked right up off of the farm, or out of a corner grocery store, or a country lawyer's office, and put into the legislature may be able to sit right down at their legislative desks and figure out just what amount of revenue a railroad or some other public corporation ought to have in order to pay a certain dividend on an unknown amount of money invested, and then formulate a rate that would provide it — but I candidly admit that I couldn't if my life depended on it.

I have heard much mournful asseveration that we haven't any real railroad men to-day — men like Tom Potter and others of his class — and that the men who control our great railway systems to-day are mere stock jobbers to whom railroad operating is secondary to railroad stock manipulating. Now, this may all be true, for what I know to the contrary, but I frankly admit I get better service both as a passenger and as a shipper under present conditions than I got in the days of Tom Potter — and get it at a decrease of from 35 to 75 per cent as compared to the rates in those "good old days" we hear so much about. I can remember when we were almighty glad to pay 5 cents a mile to ride in rickety little jim crow cars over a roadbed as rough as a Virginia corduroy road, 25 miles an hour, and the liver shaken out of us before we had traveled half-way to our destinations. Now we complain because we are compelled to pay 2 cents a mile to ride in cars more elegant than most of our homes, over roadbeds as smooth as a billiard table, speeding along at 50 or 60 miles an hour. I also remember that for many years after I came to Nebraska we had to drive our stock and haul our grain many weary miles to reach a railroad, and when we did we paid 60 per cent more to have it hauled to Chicago than we pay now. Then our live stock went in little cars, there was no watering and feeding in transit, and shrinkage en route cost us more than the freight charges cost us now. Less than twenty-five years ago, while I was living in central Nebraska, I had to send to Meriden, Conn., for a particular repair to a machine. I have the freight bill yet. I had to pay \$2.89 freight on that repair, and I was glad to pay it, for without it I couldn't do business. I can

get that same repair from the same Connecticut town to-day for less than \$1 freight charges. Maybe a dollar is too much freight now, but that is no sign that the \$2.89 was any more of an overcharge. Common sense, of which I claim to have a little bit, **tells me that density of traffic cuts some figure in rate-making** — that it would cost more to ship one car of machinery from Columbus, O., to Columbus, Neb., if only one car per year were shipped, than it would cost per car to send several hundred cars over the same distance every year. In other words, a freight rate that would mean an adequate return in a densely populated state like Illinois would be a woefully inadequate rate in Nebraska.

Of course, I know what you started saying to yourself before you got even this far in this contribution. But you are wrong. I never worked for a public service corporation in my life, never got a dollar for services from one in my life, and I have paid them hundreds of dollars. I happen to own, in addition to my home place, a little patch of land that lies about 35 miles from a railroad. It is mighty good land, too. It is just as fertile as the average Nebraska farm, but the handicap of a 35-mile haul prevents me from developing it. You gentlemen who live a mile or two from transportation facilities may think you are being gouged by the railroads in the way of excessive freight rates, but I would be mighty willing to pay what you pay — and a bit more — to any railroad that will come within five or six or even ten miles of my little farm.

Freight rates may be too high in Nebraska. I say "may be," for I do not know. But I do know that **there are five counties in Nebraska without a single mile of railroad, and I opine that if the rates are so high as to bring in a great revenue these counties would not have remained railroadless and therefore undeveloped all these years.** I know, too, that three other Nebraska counties have less than fifteen miles each of railroad, and that in other counties the people have to drive from 30 to 50 miles to reach a railroad. If the rates are so all-fired remunerative, why don't the railroads increase their revenues by extending their lines into these fertile sections, thus developing them, settling them up, and adding to the haul in and out? Do you suppose that the people living in the central part of Banner or Cherry counties would kick a minute about "exorbitant freight rates" if they could get railroad transportation right at their doors? Don't you suppose the people of Keya Paha County are vastly more interested in getting a railroad, no matter what the rates, than they are in agitating for a decreased freight rate?

The first time I shipped cattle to market I drove them overland sixty miles, loaded them into small cars and shipped them to Chicago. All the water they got from the time I loaded them until they were unloaded in the yards at Chicago was what we could give them by having a brakeman hold down the valve at a watering tank and walk along the top of the train as it pulled along, letting the torrent of water pour as best it could upon the suffering steers. And they didn't get a bite to eat on the journey. I sold them for \$3.20, and paid 30 per cent of it for freight. Last fall I shipped to South Omaha and sold for better than \$7.25, and the freight cost me less than 3 per cent of what I received for my cattle. And the shrinkage was so insignificant as to cut practically no figure. To Chicago was a trip of nearly three days then; to South Omaha last fall was less than ten hours.

In 1873 I went back to my native state of Vermont on a visit. I changed cars at Omaha, at Chicago, at Detroit, at Buffalo, at Albany and at Montpelier. After I sold my cattle last fall I again visited the old home — and changed cars once on the trip. In 1873 I rode in a coach that was about as comfortable as a farm wagon running over a frozen road after a heavy rainstorm and lots of travel. To pass from one car to another was risking one's life. When about a mile and a half from a station we'd begin slowing down with the old hand brakes, and we'd jerk and jostle and jolt till life was misery. Every time the coach door was opened a cloud of soot and dust and cinders would roll in and suffocate us. The coaches were heated by stoves at each end, and if a coach had turned over we'd have all been burned to death. Last fall I felt so good because I had received a big price for my steers that I took the trip again. I took a sleeper at Omaha and never left it till I got to Albany. The train was vestibuled and just like one long room. No clouds of smoke and soot when a coach door was opened. No jolting or jarring to make a stop or start. My trip last fall extended from the old Vermont home to Boston, thence by water to New York, by water again to Norfolk, Va., thence back to Chicago, and on home, and the whole round trip's expenses, fare, Pullman and meals en route, lacked quite a bit of costing me twice as much as my bare railroad fare for the first trip back in 1873. Then I had to hop off when I wanted something to eat and load up my stomach with whatever I could grab; now I can eat in the diner and get the best meal imaginable for 50 or 60 cents. Maybe the rates are too high now. ♣ I don't know a blooming thing about it. But if the railroad would offer to reduce the rates 50

per cent and return to the railroading methods of forty years ago, I'd say, "Don't; keep on making improvements in your service and I'll pay the present rate." **I'd even prefer the rates of forty years ago and the service of to-day, to the service of forty years ago and a reduction of 50 per cent in the present rates.**

If I knew as much about railroad management and rate-making as some men claim to know, and while making the claim haven't had a bit better chance to study up than I have had — if I knew as much about it as they claim to know, do you suppose I'd be working sixteen hours a day on my central Nebraska farm, and cleaning up each year just about what the average locomotive engineer makes? I should say not. I'd be ousting men like Mohler and Hill and their kind out of their jobs and pulling down a salary that would make me humpbacked to carry it off in \$50 bills every month. If I could sit down and make a fair freight tariff schedule — fair alike to the railroads and the people — do you suppose I would fool away my time running for a legislative job that never did pay more than \$300 a year, and only pays \$600 a year now? Not me! I'd be occupying a palatial office in some metropolitan skyscraper and dragging down the money in chunks. Somehow or other I never have learned just what it is about an election to the legislature that equips an otherwise mediocre or average man to such an extent that he can hop right in and give the biggest railroad managers in the country pointers on how to manage their business more successfully, or tell a patient people just what they must do to be saved. But it seems that election to the legislature does that very thing. I've seen it demonstrated too often to permit of a single doubt. I've seen lawyers, who had difficulty in making good at justice court practice, secure an election to the legislature, and the minute they received their certificates of election they proceeded to frame bills having for their object the remedying of every ill, industrial, social and economical, that human flesh is heir to. And any insinuation that they didn't know a darned thing about what they were doing was met with the charge of "corporation tool" or "insane partisanship." You've seen the same thing happen a thousand times if you've lived in Nebraska forty-seven years, as I have.

A few years ago we tried the experiment of making three of our state officers a railway commission, allowing them to name three secretaries to do the actual work. I never was so foolish as to believe we'd get beneficial results from such a course, therefore I was not a bit disappointed. A few years ago we amended the constitution and

elected a railway commission, giving into its charge the matter of regulation. Later we enacted the physical valuation law — which I believe was the most sensible bit of legislation enacted in Nebraska in a generation. How can we tell what rate will bring a “reasonable return” until we know what the investment is? But just as we were in fairly good shape to get somewhere we began loading up the commission with every responsibility imaginable. When we couldn’t take time to think up the right place to place a new responsibility for something, we shifted it over to the railway commission. The job of finding the physical valuation of 6,500 miles of railroad, with terminals and rolling stock and shops and everything, is a bit bigger than running a country store or looking after a quarter section farm or attending to a measly law practice in a country town. But because the railway commission hasn’t done it — and a thousand other things — in jig time, up springs the chorus that the railway commission is a “tool of the corporations,” and the legislature tries to undo the work of the past two or three years. That all the rates so loudly complained about are now in the hands of the courts, and that we haven’t arrived at the physical valuation of the railroads and thus gotten a basis for rate-making, doesn’t feaze the eminent gentlemen taken from the quiet of their country homes and thrust into the law-making body of the state. They can hop right to it and make a rate quicker than scat!

I am not defending the members of the railway commission. It so happens that I didn’t vote for a single one of them. But because they haven’t been able to accomplish the impossible I am not going to charge them with dishonesty. I know all three of them personally, and I believe them to be men of honor and integrity; faithful public officials, who are working for the best interests of all concerned. I’ve waited a whole lot longer for other things than I have waited for freight rate reduction, and am still waiting. But I am not discouraged.

As I said in the beginning, freight rates may be too high, and I rather think they are. But how am I to know? Not knowing how much it costs to build, equip and operate a railroad, I cannot, in the nature of things, know what rate will permit only a “reasonable return.” As a citizen I am helping to pay three men whose duty it is to find out what our public service corporations have actually invested and what it costs to operate them, and after so finding to fix a rate that will permit of a “reasonable return.” And even then I may differ from them on what is a “reasonable return.” The chances are that I will.

But this I do know, that even if the returns are now too high, they are seemingly not high enough to induce railroad managers to build into new Nebraska territory that needs only good transportation facilities to become a veritable garden thickly populated by a prosperous people; not enough to induce men of means to invest in inter-urban electric railroad building in thickly settled territory that would seem to offer especial inducements. I know that if I had millions and could invest them all in steam or electric lines and get as big returns as many claim are now being gouged from the people, I'd hurry so fast to invest that you could play checkers on my coat tails.

I realize fully that my views won't cut much figure, and that they will subject me to the charge of being a "tool of the corporations." But that doesn't deter me. I've earned the right to air my views by living in Nebraska forty-seven years and doing all that I could in my humble way to help make it the state that it is to-day. You'll find my name — if you know what it is — on the roll of graduates of the University of Nebraska, for I went through that great institution after I was twenty-eight years old. I've written a bit for publication, chiefly for farm papers and the weeklies in my own home country. This was written after a visit with the editor of "The Midwest," in which visit I aired my views on the question then uppermost in the legislature — whether the railway commission should be permitted to do the work for which it was created, or whether it should be snubbed and discredited by passing the Keckly bill. The editor didn't say whether my views coincided with his own or not; he simply asked me if I would write them out for publication, and I have. And this was written by the light of acetylene gas from my own plant, in the sitting-room of my farm home, during three or four evenings between the time of finishing the chores and the average farmer's bedtime. I have no idea that these views will square with those of most of Midwest's readers, but they are my own, and honest views, too.

ARE WAGES PAID THE RAILWAYS HIGH ENOUGH?

BY A TRAFFIC EXPERT*

The computations in this book are intended to show the effect on the ultimate consumer when the prices of every-day essential articles are advanced for any reason.

Manufacturers have in the past caviled at the arguments contained herein, saying that the raw material in the manufactured product could not stand an advance in rates. The compilers of this work claim there is no justice in this statement. It is a well-known axiom that in the end the consumer pays the freight.

It is hoped to establish by the prices herein submitted that the operation is more beneficial than painful. A manufacturer who denies the right of the railroads to make a profitable wage stands in his own light, for nothing is truer than **when the biggest spender of all spenders stops spending**, the retrenchment thereby inaugurated backs up to the source of everything and affects the business of the country to a great extent.

Railroads are a matter of vital necessity to all of us and render a service essential to our daily existence. Conditions have arisen which make their pay for the work done inadequate, but that fact seldom enters our minds.

A little insight into what the railroads have done and are doing may help us to realize the relations between the people and the carriers who serve and must always serve the daily wants of the public. The public understands passenger travel better because of direct participation in it, but freight traffic is a closed book to all except those engaged in overland commerce; yet the tonnage of freight compared with weight of passengers is — in round numbers — nearly thirty to one, while the average haul of freight is four times the length of the average passenger's journey.

For this gigantic freight service (gigantic is a small word when one considers that in the United States, Canada, Mexico, Central America, and Panama there are some 154 railroad systems with 230,000 miles of main line track) the railroads in the United States operating between Chicago and the Atlantic seaboard receive an average revenue of three-fourths of a cent per ton per mile.

* The mathematical computations contained herein certified correct by Haskins & Sells, Certified Public Accountants of New York.

Is this enough? Are the railroads adequately remunerated for their services as burden bearers for the public? Can anyone show that they are overpaid?

Let us review in brief what the railroads of the United States have accomplished. It is about eighty-five years since the first railroads were built in America, and two years later that locomotives of the following specifications were the best obtainable: "The engine when in operation must not exceed three and one-half tons in weight. It must be capable of drawing, on a level road day by day, fifteen tons, inclusive of weight of wagons, at a speed of fifteen miles an hour." At that time, also, it should be remembered, there were less than 250 miles of railroad in the entire country. To-day standard locomotives exceed two hundred tons in weight and must be capable of a sustained speed of more than sixty miles an hour.

It is a common practice among business men to increase the wages of experienced and faithful employees. Applied to the railroads this is all one-sided, for the reason that they have in the past and are now paying their experienced and faithful employees an increased compensation, while they have stood a maximum stationary wage for many years and in many instances a wage cut. Despite the increased efficiency and added value in the service provided by the nation-wide extension and expansion of our railroad systems, freight rates in the whole country have steadily dropped from one and one-fourth cents per ton per mile in 1880 (the first year in which records were officially kept) to three-fourths of a cent for several years past.

The increased service has developed an enterprise in which an army of more than 1,500,000 * men is employed in the transportation of commodities at an average cost more than forty per cent lower than in any other country and which is paid an average wage of more than fifty per cent higher than paid on any railroad in any other country.

Part of the continuous decrease in freight rates is due to competition and partly to orders of the several commissions charged with rate-making powers. Rates are at a point where, in many instances, the carriage of certain freight is not profitable to the railroads. Despite rigid economies in operation, the expense of moving freight has advanced in the last few years. A general readjustment of rates that will enable a proper service to be maintained is a present necessity. Wages for all classes of employees are higher, terminal facilities cost far more, equipment and supply costs have increased, maintenance and repairs are greater. Every item of cost entering into

* Over 1,900,000 in 1913.

freight carrying has notably increased, while the rate per ton per mile has decreased.

The average reader may think this is of no interest to him. It is, for everything he has, wears, or uses, carries a freight rate, and he is interested — if in no other way — in maintaining the efficiency and safety of the service.

To be efficient, the railroads must spend money. If the wages to do this be insufficient, lack of efficiency comes. This is equally true of all business enterprises.

The service performed by the railroads can be illustrated by the following simile:

¶ The postage on a letter is two cents. If a railroad company operating between New York and Chicago is called upon to write a letter, to recoup its Treasury for the two cents spent, it has to haul three tons of freight one mile, and that does not quite pay the two cents postage. Imagine any other method of transporting three tons of freight one mile for the sum of one and four-fifths cents.

But, you may say, to allow the railroads to advance their freight rates will increase the present "high cost of living." Will it? What relation, think you, do freight rates bear to the selling price of commodities?

The railroads now get two and two-fifths cents for carrying a pair of shoes from Boston to Chicago. If the rate were increased 5%, the freight would still be less than three cents per pair between points mentioned. Should this affect the average selling price — \$4.00 per pair?

At the present time on bituminous coal from the mines in West Virginia to the Atlantic Seaboard, a two-cent stamp will pay the freight on one ton of coal over six miles.

Look over the rate table shown in the following pages and see how small a fraction the railroads receive; take any item in which you are personally interested, add one-twentieth (the 5% increase asked for by the railroads) to the freight and see how much more the article would then cost you. For example: between the points specified, the increased freight on one pound of sugar would be fifteen-thousandths of a cent (\$.00015); on a barrel of flour two and three-quarters cents (\$.0275); on one pound of butter thirty-eight thousandths of a cent (\$.00038); on one pound of coffee sixteen-thousandths of a cent (\$.00016); on one bushel of potatoes one cent (\$.01); on one dozen eggs fifty-seven thousandths of a cent (\$.00057); on one pound of dressed beef twenty-five thousandths of a cent (\$.00025).

The following table gives the railway share in the selling price of 87 articles of common use.

SHARE OF RAILWAY FREIGHT COST IN SELLING PRICE OF 87 COMMODITIES

Commodity	Movement	Miles	Freight	Selling Price	R. R. Share of Selling Price
Apples.....	Buffalo to N. Y.	438	1/17c. ea.	1½c. ea.	1/25
Automobile.....	Detroit to N. Y.	798	\$21.47 ea.	\$750.00 ea.	1/35
Axe.....	N. Y. to Chicago.....	1,000	2½c. ea.	75c. ea.	1/30
Baby Carriage.....	N. Y. to Chicago.....	1,000	\$1.12½ ea.	\$25.00 ea.	1/22
Bacon.....	Chicago to N. Y.	1,000	½c. lb	25c. lb	1/75
Baking Powder.....	N. Y. to Chicago.....	1,000	¾c. lb can	30c. lb can	1/45
Bananas.....	N. Y. to Chicago.....	1,000	2 1/9c. doz.	25c. doz.	1/12
Bath Tub.....	N. Y. to Chicago.....	1,000	\$2.81 ea.	\$30.00 ea.	1/11
Bat (baseball).....	N. Y. to Chicago.....	1,000	1½c. ea.	75c. ea.	1/50
Beef (dressed).....	Chicago to N. Y.	1,000	½c. lb	25c. lb	1/50
Beer.....	Milwaukee to N. Y.	1,046	3/10c. glass	5c. glass	1/17
Bicycle.....	N. Y. to Chicago.....	1,000	73c. ea.	\$25.00 ea.	1/34
Broom.....	N. Y. to Chicago.....	1,000	2¼c. ea.	30c. ea.	1/13
Butter.....	Chicago to N. Y.	1,000	¾c. lb	40c. lb	1/53
Cattle (live).....	Chicago to N. Y.	1,000	3/10c. lb	8c. lb	1/27
Cheese.....	N. Y. to Chicago.....	1,000	3/5c. lb	23c. lb	1/38
Chicken (dressed).....	Chicago to N. Y.	1,000	1c. lb.	22c. lb	1/22
Cigarettes.....	N. Y. to Chicago.....	1,000	1/17c. box	10c. box	1/170
Cigars.....	N. Y. to Chicago.....	1,000	1/42c. ea.	5c. ea.	1/210
Cocoa.....	N. Y. to Chicago.....	1,000	1c. lb	38c. lb	1/38
Coffee, per lb.....	N. Y. to Chicago.....	1,000	¾c. lb	30c. lb	1/90
Coffee, per cup.....	N. Y. to Chicago.....	1,000	1/66c. cup	5c. cup	1/330
Coffee Pot.....	N. Y. to Chicago.....	1,000	¾c. ea.	30c. ea.	1/40
Collar.....	Troy to Chicago.....	825	1/18c. ea.	12½c. ea.	1/225
Corn (canned).....	Chicago to N. Y.	1,000	¾c. can	8c. can	1/11
Desk (office).....	N. Y. to Chicago.....	1,000	\$3.09 ea.	\$30.00 ea.	1/10
Dish Pan (14 qt.).....	N. Y. to Chicago.....	1,000	1¾c. ea.	40c. ea.	1/29
Eggs.....	Chicago to N. Y.	1,000	1 1/7c. doz.	30c. doz.	1/26
Flour (for one loaf bread).....	Minneapolis to N. Y.	1,380	½c. loaf	5c. loaf	1/15
Flour (bbl.).....	Minneapolis to N. Y.	1,380	55c. bbl.	\$6.00 bbl.	1/11
Ham.....	Chicago to N. Y.	1,000	½c. lb	18c. lb	1/54
Hammer.....	N. Y. to Chicago.....	1,000	11/5c. ea.	65c. ea.	1/54
Hammock.....	N. Y. to Chicago.....	1,000	4c. ea.	\$3.00 ea.	1/75
Harness, single, set...	N. Y. to Chicago.....	1,000	43½c. ea.	\$35.00 ea.	1/80
Harrow.....	Chicago to N. Y.	1,000	\$1.05 ea.	\$11.00 ea.	1/10
Hat (derby).....	N. Y. to Chicago.....	1,000	2c. ea.	\$2.00 ea.	1/100
Hogs (live).....	Buffalo to N. Y.	438	1/6c. lb	8½c. lb	1/51
Hose (lawn, 50 ft.).....	N. Y. to Chicago.....	1,000	13c. ea.	\$5.00 ea.	1/38
Hosiery (ladies).....	N. Y. to Chicago.....	1,000	1/10c. pair	25c. pair	1/250
Ice Cream Freezer (4 qt.).....	N. Y. to Chicago.....	1,000	12c. ea.	\$2.85 ea.	1/24
Lard.....	Chicago to N. Y.	1,000	2/5c. lb	16c. lb	1/40
Lawn Mower.....	Newburgh to Chicago.....	885	25c. ea.	\$3.00 ea.	1/12
Lemons.....	N. Y. to Chicago.....	1,000	1 1/20c. doz.	25c. doz.	1/24
Motorcycle.....	N. Y. to Chicago.....	1,000	\$3.83 ea.	\$225.00 ea.	1/59
Mowing Machine.....	Chicago to N. Y.	1,000	\$3.85 ea.	\$42.00 ea.	1/11
Negligee Shirt.....	N. Y. to Chicago.....	1,000	9/10c. ea.	\$1.00 ea.	1/111
Oatmeal.....	Chicago to N. Y.	1,000	¼c. lb	5c. lb	1/20
Olive Oil.....	N. Y. to Chicago.....	1,000	4/5c. bot.	25c. bot.	1/31
Onions.....	Chicago to N. Y.	1,000	½c. qt.	10c. qt.	1/20
Oranges.....	Los Angeles to N. Y.	3,106	5c. doz.	40c. doz.	1/8
Overcoat.....	N. Y. to Chicago.....	1,000	6c. ea.	\$18.00 ea.	1/300
Peanuts.....	N. Y. to Chicago.....	1,000	1/11c. bag	5c. bag	1/55

SHARE OF RAILWAY FREIGHT COST IN SELLING PRICE OF
COMMODITIES

Commodity	Movement	Miles	Freight	Selling Price	R. R. Share of Price Selling
Peas (canned).....	Chicago to N. Y.....	1,000	7/10c. can	10c. can	1/14
Piano.....	N. Y. to Chicago.....	1,000	\$6.00 ea.	\$250.00 ea.	1/42
Plow.....	Chicago to N. Y.....	1,000	46¾c. ea.	\$14.00 ea.	1/30
Potatoes.....	Traverse City, Mich., to N. Y.....	1,088	21c. bush	\$1.00 bush.	1/5
Rake (garden).....	N. Y. to Chicago.....	1,000	1¾c. ea.	50c. ea.	1/27
Raisins.....	N. Y. to Chicago.....	1,000	3/5c. lb	8c. lb	1/13
Refrigerator.....	N. Y. to Chicago.....	1,000	79c. ea.	\$15.00 ea.	1/19
Rice.....	N. Y. to Chicago.....	1,000	¼c. lb	5c. lb	1/20
Salt (3 lb bag).....	N. Y. State Wells to Chicago	700	2/5c. bag	5c. bag	1/12
Saw.....	N. Y. to Chicago.....	1,000	13/10c. ea.	\$1.75 ea.	1/135
Sewing Machine.....	N. Y. to Chicago.....	1,000	\$1.01 ea.	\$30.00 ea.	1/30
Shoes.....	Boston to Chicago.....	1,025	22/5c. pair	\$4.00 pair	1/166
Shot Gun (dbl. bbl.)..	N. Y. to Chicago.....	1,000	7½c. ea.	\$50.00 ea.	1/666
Shovel.....	N. Y. to Chicago.....	1,000	3c. ea.	65c. ea.	1/22
Skates (ice).....	N. Y. to Chicago.....	1,000	2½c. pair	\$1.50 pair	1/64
Skates (roller).....	N. Y. to Chicago.....	1,000	23/5c. pair	75c. pair	1/29
Soap (laundry).....	N. Y. to Chicago.....	1,000	¼c. cake	5c. cake	1/20
Socks.....	N. Y. to Chicago.....	1,000	1/17c. pair	25c. pair	1/425
Starch.....	Chicago to N. Y.....	1,000	1/5c. lb	5c. lb	1/25
Sugar.....	N. Y. to Chicago.....	1,000	3/10c. lb	4¾c. lb	1/16
Suit Case.....	N. Y. to Chicago.....	1,000	21c. ea.	\$6.00 ea.	1/28
Suit of Clothes.....	N. Y. to Chicago.....	1,000	64/5c. ea.	\$15.00 ea.	1/220
Suspenders.....	N. Y. to Chicago.....	1,000	1/5c. pair	25c. pair	1/125
Tapioca.....	N. Y. to Chicago.....	1,000	3/5c. lb	10c. lb	1/17
Tea (lb).....	N. Y. to Chicago.....	1,000	1c. lb	35c. lb	1/35
Tea (per cup).....	N. Y. to Chicago.....	1,000	1/80c. cup	5c. cup	1/400
Tennis Racquet.....	N. Y. to Chicago.....	1,000	1½c. ea.	\$5.00 ea.	1/444
Tomatoes (canned)...	Chicago to N. Y.....	1,000	11/15c. can	10c. can	1/9
Typewriter.....	N. Y. to Chicago.....	1,000	45c. ea.	\$100.00 ea.	1/222
Umbrella.....	N. Y. to Chicago.....	1,000	11/10c. ea.	\$1.00 ea.	1/91
Underwear (summer)..	N. Y. to Chicago.....	1,000	1c. suit	\$1.00 suit	1/100
Undershirt (winter)..	N. Y. to Chicago.....	1,000	12/5c. ea.	\$1.50 ea.	1/107
Wheelbarrow.....	N. Y. to Chicago.....	1,000	49c. ea.	\$3.65 ea.	1/7
Wool (raw).....	Billings, Mont., to N. Y....	2,262	13/10c. lb	15c. lb	1/11
Wringer.....	N. Y. to Chicago.....	1,000	13¾c. ea.	\$6.00 ea.	1/44

The usual commercial basis — 100 lbs.— was used in determining results reached.

An average weight and price were used for articles varying in weight and price.

Carload or less than carload rates were used according to the customary method of shipping

WHO GETS THE LION'S SHARE OF THE COST OF LIVING?

BY JOHN DUFFY.*

Senator Thomas P. Gore of Oklahoma, Chairman of the Senate Committee on Agriculture, made the statement in Philadelphia, December 4th, that out of farm produce that retails annually for \$13,000,000,000 the farmers get only \$6,000,000,000. The railroads, he said, get approximately \$500,000,000.

To illustrate Senator Gore's figures the Lehigh Valley Railroad has made a compilation of the most commonly used farm products, showing how much the farmer, the middlemen, the railroads, and the retailers are paid by the community for their services.

Using the consumer's dollar as a basis, the figures obtained by the Lehigh Valley Railroad indicate that the farmer gets an average of 50½ cents, packers, local shippers, distributors and retailers combined get 44½ cents and the railroads get five cents. In other words, the railroads get one-twentieth of the retail price, and this is for an average haul of 1,500 miles.

As the following figures show, they get less for their services than any agency of distribution.

	Producer	Middleman	Railroad	Retailer	Middleman and Retailer	Total
Eggs.....	50 cents	24½ cents	½ cent	25 cents	49½ cents	\$1.00
Butter.....	65 "	12 "	½ "	22½ "	34½ "	"
Milk.....	44½ "	22½ "	9 cents	24 "	47 "	"
Rice.....	49 "	28 "	6 "	17 "	45 "	"
Potatoes.....	37 "	27 "	5 "	31 "	58 "	"
Dressed Poultry.....	76 "	12 "	1¼ "	10¾ "	22¾ "	"
Onions.....	35 "	27 "	5 "	33 "	60 "	"
Oranges.....	41 "	30 "	11½ "	17½ "	47½ "	"
Canned Peas.....	40 "	34 "	3 "	23 "	57 "	"
Dried Prunes.....	39 "	26 "	10 "	25 "	51 "	"
Dried Apples.....	46 "	28½ "	2½ "	23 "	51½ "	"
Dried Apricots.....	53 "	19 "	7 "	21 "	40 "	"
Dried Beans.....	73 "	11 "	4 "	12 "	23 "	"
Canned Salmon.....	59 "	16 "	7 "	18 "	34 "	"
Sugar.....	90 cents		¾ cents	9¼ cents		"
Tea.....	47 "		3 "	50 "		"

*From Figures Compiled for the Lehigh Valley Railroad Company.

These figures are based on the varieties of food that go to make up about nine-tenths of every family's grocery bill. Meat is not included, on account of the difficulty in arriving at a fair figure. But on such commodities as butter, eggs, milk, rice, potatoes, onions, sugar, tea, and the many kinds of canned, dried and prepared fruits and vegetables, it is entirely feasible to arrive at comparatively accurate figures. Any variation in the selection of the list will, of course, make some difference in the relative position of the producers and distributors, but the railroad's share remains the same. That can be figured to a certainty. For a 1,500-mile haul the railroads get only five cents.

Confining the inquiry to the haul over the Lehigh Valley Railroad itself, products from the large farming district in Western New York are brought to New York City, an average of nearly four hundred miles, for a trifle over two and a half cents out of the consumer's dollar. While this is considerably less than the average haul, it shows that the butter, eggs, apples, poultry and vegetables produced in all that rich and productive section are taken to their best market, New York City, for one-fortieth of what the city family pays for them.

The accuracy with which these figures have been obtained can be shown by comparing them with the figures of the Department of Agriculture. For instance, the Lehigh Valley gets half a cent out of a dollar's worth of Western New York eggs sold in New York City, the farmer getting 50 cents and the 49½ cents being divided among shippers, producers and retailers. The Yearbook of the Department of Agriculture for 1910, which takes up the question of freight rates, gives the average freight rate on a dollar's worth of eggs as six tenths of one cent, a trifle more than the Lehigh Valley charges.

The Department of Agriculture says, "When the farmer receives 50 per cent of the consumer's price, the freight charge on butter is about one half of one per cent of the consumer's price." The railroad's figures show the railroad also gets only half a cent out of each consumer's dollar, even when the farmer gets as high as 65 cents.

On butter, eggs and sugar, however, the railroads receive the least share of the consumer's dollar. On commodities which are worth less in comparison to bulk, the freight charge is naturally higher. On canned peas it is three cents, canned tomatoes four cents, potatoes five cents, and on such vegetables as turnips and cabbages six cents. But canned salmon is brought all the way from the Pacific Coast to New York — 3,000 miles — for seven cents out of the dollar for which it is sold. The highest rate the railroads get on a food product is

11½ cents of the consumer's dollar for bringing oranges in refrigerator cars, which are iced five times, from California to New York. All of which would tend to show that the railroads are being paid very little for the service they perform, and are not in any way responsible for the high cost of living.

Their charge is so low, in fact, that if the railroads are granted the five per cent increase in freight rates for which they have petitioned the Interstate Commerce Commission, it will only make a difference of thirty cents to each household a year. This does not refer to food alone, but to every article of food, clothing, furniture or fuel that enters the house during the year. At the outside, the additional cost for food to each household, based on an increased freight rate, will be fifteen cents a year.

PRICES AND THE RAISING OF RATES

BY CLÉMENT COLSON.

Member of the Institute; Inspector-General of Bridges and roads;
Councillor of State of France.

(From the Revue politique et parlementaire.)

Among the characteristic economical phenomena during the last few years, there has hardly been one more marked than the general rise in prices. This rise at first only affected railways by increasing their working expenses. It now begins, on a rather large number of railways, to have as consequence a rise in the rates. Following as it does on the quick and continued fall in the cost of carriage, which had been one of the essential factors of the economic progress during the last century, it is a phenomenon which merits closer consideration.

When the public talks of change of prices, it is as a rule only the change in the retail prices of foods which is considered. Economists who wish to measure these changes exactly, generally take as basis the average prices recorded in the wholesale markets where the chief agricultural and industrial products are sold; and they call these prices index numbers. As a rule only the actual purchases of goods are taken into consideration, although these form scarcely half of the current transactions; the prices taken include, in fact, neither wages nor rent, nor cost of carriage. In order to form a correct idea of what one and the same given sum of money represents at different periods, it is necessary to consider both the wholesale and the retail price of the different products, that of the services rendered by the different classes of workers, by the owners of buildings which are let, by carriers, etc. This would involve considerable work which, as far as we know, has never yet been attempted in its entirety.

But the investigations made about each class of prices separately enable us, if not to measure the general movement, at least to appreciate its direction and its order of magnitude. Naturally this movement has not manifested itself in the same way in the different classes of transactions, in the different countries separated by customs tariffs of greater or less height. It nevertheless presents a general and rather characteristic appearance.

As regards industrial products, until the last few years, leaving oscillations caused by alternate booms and slumps out of considera-

tion, there was a general and rapid fall, due to technical progress. On the other hand, agricultural products had continually been rising in price in Western Europe until between 1875 and 1880, owing to the growing density of the population living in a limited area. But about this period, the enormous reduction in the cost of carriage, resulting from the development of steamships and railways, made it possible to draw part of the food required for the people living in the old countries, from land in the New World hardly yet settled; the rapid fall in prices which led to the agricultural crisis in the end of last century was the result. Then the increase of population in the New World and in the Old, and the increased consumption due to increased wages, once more led to a rise in prices, which has been going on for the last fifteen years.

If one tries to measure the general movement of wholesale prices, by comparing the customs figures for the whole imports and exports of France, one finds a rise of about 20 per cent between 1847 (when statistics were first kept) and 1860-1865, followed, as compared with the prices of the latter period, by a gradual fall of about 40 per cent, till 1896-1897 was reached. At that time, the tendency was again reversed, and the resulting rise has by now amounted to nearly 20 per cent as compared with the prices of about fifteen years ago. It must not be forgotten that the present moment is probably the culminating point of a period of growth of business which will no doubt be succeeded by a short depression.

The retail prices have not followed exactly the movements which we have just mentioned, because the difference between wholesale and retail prices is naturally becoming more marked, as the pay of the people employed and the rents of shops in neighborhoods which are becoming more and more crowded, are both increasing. Leaving out of consideration products of exceptional quality, the price of which is continually growing with the number of families rich enough to buy them, one finds, as regards ordinary objects, the following tendencies:

The price of furniture and of clothing steadily fell until 1896 to 1897, and has been rising slightly since. As regards food, the rise was very marked until 1880. The period which has elapsed since, is divided into two equal parts, the first being characterized by a considerable fall, the second by a rise which has not yet reached the level of thirty years ago, although the contrary is often thought to be the case.

Wages, on the other hand, have increased continually. The in-

crease, slow before 1850, was very great, both in agriculture and in the industrial world between that time and the time of the agricultural crisis. It had become much slower in agriculture and a little slower in the industrial world about thirty years ago; it has once more become accelerated, at first in the towns, then in agricultural districts about fifteen years ago. One may characterize the conditions of life of the workers, at two intervals of thirty years by the following comparative figures:

	1850	Years. 1880	1910
Wages.....	51	82	110
Cost of a given standard of living.....	85.5	110	104
Purchasing power of wages.....	59.5	74.5	106

These figures were worked out in an investigation made by the general statistical department of France, and were determined with all that care and accuracy which characterize the work of the head of that department, Mr. Lucian March, the corresponding figures for 1900 being assumed to be 100.

The statistics on which these figures are based were chiefly collected in the towns, especially in Paris; but it seems that the results may certainly be extended to the country, at least as far as the three years in question are concerned. It was only in part of the years between 1880 and 1910 that the agricultural crisis seems to have prevented the two movements from being parallel.

It must incidentally be noted that the rise in wages produced by the natural play of economic forces, especially by the technical progress and the accumulation of capital, was more rapid between 1850 and 1880 than between 1880 and 1910. The statistics confirm what the study of the mechanism of prices teaches (contrary to the opinion held nearly universally), that the trades-union movement (much more powerful in the second thirty-year period than in the first) is unable to accelerate the increase of wages. We ourselves even think that it has tended during the last few years, to make it slower by spreading among workpeople ideas which have considerably reduced the output of labor. It follows that the net cost, to the employer, of a given piece of work has increased, during the last few years, much more than the figures showing the rise of wages per hour or per day would indicate. This net cost no doubt would be reduced, the cost of living would also be reduced, the gain of the workman would be appreciably increased, and his power of purchase would be much increased, if the slacking which reduces the productivity of work were

less marked. Now it is above all on this productivity on which, thanks to the mental attitude of the workmen, the trades unions can act, while wages, which depend more on supply and demand, escape their influence as soon as they ask for increases which are not justified by the state of the markets.

In towns, rents have also increased considerably. It is true that the cost of carriage has as a rule been much reduced, just as the cost of long-distance travelling and like, until quite recently, the cost of carriage of goods.

The details we have given are based on the French statistics. But, with slight differences in the dates and in the magnitude of the movements, the general state of affairs has been the same in the whole of Europe, and is now even in America. One may sum it up by saying that all prices, wages included, have markedly risen for the last hundred years; but that this general rise, after becoming much slower in the latter part of the nineteenth century particularly between 1882 and 1897, has become much more accentuated since. What is characteristic of the most recent period is that the increase has become almost general in character. Although technical progress still tends to reduce the net cost of many industrial and agricultural products, **the margin is not large enough to counterbalance the increase resulting from the cost and the poor output of labor, and also from the increased demands due to the better condition of the working classes.**

We need not investigate the causes of this general rise in prices. We may however remark that even if the rise or fall of the relative value of products or of sundry services is necessarily due to individual causes in each case, yet a movement which simultaneously affects all prices, with very few exceptions, can hardly be explained except by financial causes. Now this cause at once strikes our eye. The increase in the production of gold and the development of methods of payment without use of coin (notes, cheques, bills, etc.), have for a long time seemed to advance more quickly than the need for coin. Although considerably increased by the exploitation of the gold-fields of Siberia, the output of gold did not reach, on the average, 200 million francs (\$38,600,000) per year between 1840 and 1850. Californian and Australian mining increased this, from 1851 to 1870, to 673 million francs (\$129,889,000); it then fell, from 1871 to 1890, to 572 million francs (\$110,396,000). But the Transvaal mines have become developed to such a point that it amounted to 1,089 million francs (\$210,117,000), on the average, between 1891 and 1900, to

1,959 million francs (\$378,087,000) between 1901 and 1910, and finally to 2,423 million francs (\$467,639,000) in 1911. It would have been very improbable that such an increase in the medium of exchange would not have affected its purchasing power, that is, caused a general rise in prices.

If the output of gold continues to increase, nothing proves that our descendants will not witness a phenomenon similar to that general rise which was caused, in the sixteenth century, by the influx of precious metals from America and which multiplied all prices by 3 according to some authors, and by 5 according to others. The pre-existence of a greater stock of gold than four centuries ago, the enormous development of business, the demonetization of silver, and the adoption of gold in the Far East at present reduce and no doubt will continue to reduce, in the future, the importance of this movement; it is nevertheless very appreciable at present and may become much more marked.

But there is one industry, that of railways, in which the selling prices do not follow, by the simple play of supply and demand, the general upward movement which affects it, by the increased cost of everything it buys and especially by the increased wages of its employees. The railway service is a public service, which can practically only be operated by the State or by concessionaries it has given powers to for that purpose. The operation has the character of a monopoly and, when a country tries to establish competition, it only succeeds in dividing the profits of this monopoly between several undertakings. Consequently the price of carriage cannot be left to mutual agreement; it must be based on tariffs fixed by the public powers or under their control. Even in Anglo-Saxon countries the State, which had taken quite a different point of view at the start, has not been able to leave the companies that freedom of action which it had granted them at the start, and it was compelled to organize a control which always has a somewhat arbitrary character as it is not, as in our country, defined by contract.

Under these circumstances, the raising of tariffs, even if it is made necessary by economic conditions, always has the appearance of a one-sided and high-handed act. That act is resented all the more by public opinion, as this has been accustomed to see the tariffs fall almost continually, by a movement which technical progress and the elasticity of traffic have made general, apart from very rare exceptions. The States have very rarely authorized the raising of the tariffs by companies under their control, and when they substi-

tuted State working for company working, they have generally tried to make the new system popular by reducing rates. In England, when the company desired to make up, by diminishing former reductions which had become unnecessary at certain points, for new reductions which were imposed on them elsewhere in order to reduce inequalities in the rates,—in America, when the different systems had at last come to an agreement which made it possible to eliminate the abnormal reductions which competition had previously brought about in sundry cases,—laws were passed in order to give the authorities a quasi-judicial power to oppose any raising of the rates. The freedom of action of the companies, the flexibility of the tariffs which have formerly done so much to develop the American continent, by facilitating the rapid growth of railways, are no longer tolerated in the United States, since the need of new lines is less strongly felt than that of equal treatment of competing traders. Increases of rates, always much rarer than decreases, have long become quite exceptional nearly everywhere, and have even become so, during the last few years, in America.

But the rapid growth of operating and establishment expenses has begun seriously to modify the situation in many countries. It was in the slump which followed the boom of 1906 and 1907 that this increase made itself most felt. As we have several times mentioned, the movement of expenses always lags a little behind that of receipts: the progression of the traffic goes in rushes, the most recent occurrences of which have been a little in advance of the date corresponding to the periodicity of approximately ten years previously observed in the regular alternation of industrial slumps and booms. At the beginning of such a rush, railways cope with it, as well as they can, with the means they have available, and it is only when they have ascertained for what traffic and in what directions needs become manifest, that they begin the troublesome and expensive work of adding to their plant. Then, when the diminution of the traffic makes it more difficult to cover further expenses, they try to reduce them. This is what happened in all countries when the slump of 1907–1908 seriously affected the financial position of many railway systems. But the results of the measures taken to effect economies have been annihilated, when the improvement of business has taken place after a very short stop, by the general rise of prices. This rise is no doubt partly temporary, as regards coal and metal; but it will probably be lasting as regards wages, and the resulting expenditure is increased still further by the need of counterbalancing the reduction in the

output of the men by increasing their number. It is then that the idea of raising the tariffs has gained ground, and has been applied in a number of countries.

It is not necessary to refer to Germany, where, as we have often explained here, the abundance of the traffic and the exceptionally advantageous conditions resulting from the configuration of the country and the regulations which are very favorable to the railways, ensured excellent results, even when the working expenses were comparatively very high. After the enormous reduction of net profits which was recorded in 1908, a serious attempt was made to reduce expenses; then the increase of traffic was sufficiently great to ensure in 1911, for the capital engaged, a remuneration exceeding the maximum attained in 1906, although the capital had in the mean time been increased by 3 ½ milliard francs (£140 millions). However, in the smaller States, where the railways are less prosperous than in Prussia, the question of raising the rates has been repeatedly discussed, and Wurtemberg, giving up the uniform tariffs fixed for the whole Empire in 1907, increased in 1909 the price of fourth-class tickets from 2.5 to 2.875 centimes per kilometre (from .77 cents to .88 cents per mile). The Prussian government has abolished the export rates for coal, but less with a view to increasing its receipts, than with that of reserving its fuel to national industries. As regards home traffic, it has limited itself to making the public pay for the increased mileage resulting from sending the traffic by the least encumbered route. As for the stamp duty levied by the Empire on way-bills and on tickets, and which is progressive, according to class, as regards passengers, this has given rise to much disappointment owing to people having taken to travelling in lower class carriages; and it has the character more of a general tax than of a rise in the rates, so that the receipts of sundry States suffer, rather than profit by it.

In England, it has been shown that the successive interventions of the government, when a strike was threatened in 1907 and when it was declared in 1911, had led the companies to grant concessions to their men, subject to the promise that legal facilities should be given to them for two purposes: 1st, permission for agreements or amalgamations enabling them to reduce expenses by eliminating the competition existing between many points, not in rates (in this respect an agreement had long existed between the railways), but in the facilities offered to the public; 2nd, permission to raise goods rates. A bill presented in 1912, which settled these two questions while it

imposed sundry new obligations on the companies, did not pass. The government, called upon to redeem its promises, finally induced the two Houses to pass a bill, forming a short addition to the act of 1894, by virtue of which the railway and canal commission can oppose the unjustifiable raising of rates for goods. This addition, which came into force in March 1913, **declares that an increase in the rates shall be considered justifiable, when it is proved that it is intended to cover the extra expense of the goods service resulting from improvements made in the wages and conditions of work of the men, subsequent to August 19, 1911 (date of the strike).**

In January 1912 already, the companies had made sundry increases in passenger fares, to which the restrictive act passed in 1894 did not apply; the increases, which were but small, only applied to certain exceptional cases. Using, as regards goods, the new powers with which they were armed, the companies instituted, on July 1, 1913, increases equivalent to an extra charge of 4 per cent on the whole traffic. It is natural that the customers of an industry should thus bear the consequences of an increase in the expenditure; that is what has happened in every free industry, both when such an increase has resulted from an intervention of the public authorities (so frequent nowadays in questions of labor) and when it has resulted from natural changes in price. With respect to the railways, the government has kept its word by removing the legal obstacle which prevented the companies from recouping themselves for the pressure exercised on them for the benefit of the employees. As regards agreements between different railways in order to reduce expenses, the confused state of legislation has made this possible, in most cases, without any new act.

In Italy, as in England, it is the improvement of the condition of the workpeople which has led to an increase in the rates. The former system of leasing which was finally ended in 1905, did not provide sufficient means for supplying the additional plant required by the companies and had not allowed the latter to cater for the needs to the traffic. Operation by the State, under the able and energetic management of Mr. Bianchi, by an administration having sufficient independence, has naturally improved the service. **But expenses have grown considerably, largely on account of the acts passed by parliament, under pressure from the employees, to increase the pay of the latter.** The last act, of April 13, 1911, decides that part of the new expenses is to be covered by an increase in season-ticket rates and in the rates for specially reduced tickets; this has produced 6

million francs (\$1,158,000), or a little more than 3 per cent of the total passenger receipts. At the same time, an increase in the accessory charges on goods yielding nearly 3 million francs (\$579,000), or a little more than 1 per cent of the total slow-freight receipts, has been authorized in order to cover the expenditure incurred by acquiring a reserve of 4,000 wagons, for the carriage of agricultural produce.

In Switzerland, an act of June 23, 1910, has also raised the pay of employees very materially; its full application will involve an increase of 14 million francs (£560,000) in the whole pay which amounted to 60 million francs (£2,400,000) in 1910. As the increases are automatic in many cases, we may ask ourselves whether the service will improve at the same time as the pay of the employees. On the other hand, the price of season-tickets, which are much used in that country, have been raised by amounts varying from 9 to 12.5 per cent. Other increases in the price of return tickets were proposed, but the federal government did not venture to authorize them.

In Belgium, for several years, the State has been trying to cover, by means of increases in the rates, the expenditure resulting from the increase in the pay of the railway employees. It has increased the registration fee from 20 to 50 centimes (from 3.86 cents to 9.65 cents) (this is only 10 centimes [1.93 cents] in France). It has taken measures to prevent grouping which made the cheap carriage of small parcels possible. Finally, after long struggles, and a first unsuccessful attempt, it has succeeded in raising the rates for coal carried short distances, by amounts of up to 50 centimes per ton (9.65 cents per English ton).

In Denmark, the net profits, per kilometre, of the State Railway fell from 6,300 francs (\$1,960 per mile) in 1905-1906 to less than 2,100 francs (\$653 per mile) in 1909-1910, with gross receipts exceeding 31,000 francs (\$9,641 per mile). The public authorities took steps to put into force, on December 1, 1911, new rates which should increase the total receipts by about 9 per cent.

In Russia, the slow-freight rates for a large number of manufactured goods were materially increased in 1910. Some increases had already been made in passenger fares. But owing to the poverty of the population, they had the result that the traffic decreased and that people travelled in a lower class; hence some of these increases had to be given up.

It is above all in Austria and in Hungary that the efforts made have been long and considerable.

In Austria, the State system, considerably increased by the policy of nationalization which is gradually making all the great companies disappear, except the Southern Austria, is far from earning interest on the capital invested. For a long time the government has been trying to increase the revenue by raising the rates. Already some years ago, it raised the station charges considerably. In 1910, a general reform was carried out, applying to both passenger fares and goods rates; it was expected that the former would yield 10 million francs (\$1,930,000) more, the latter 37 million francs (\$7,141,000) more. But there were serious disappointments; and in 1911 and 1912 new and important increases were made, applying partly to certain special merchandise (cement, timber, alcohol, petroleum, coal, sugar), partly to merchandise generally carried in full truck loads.

In Hungary, still more radical measures were taken. In 1909, the net profit of the State lines was 45 million francs (\$8,685,000) less than the interest charges. In 1910 and 1911, most of the goods rates were raised very appreciably. The results, although satisfactory, were insufficient. Accordingly, on March 1, 1912, all the normal quick-freight rates were raised 7 per cent, and the special quick-freight rates and all the slow-freight rates 5 per cent. **Finally, the celebrated zone tariff for passengers was entirely given up, which had formerly been lauded as a vast improvement.**

One knows that this tariff, established in 1889, had for its chief object, firstly, the development of the suburban traffic, secondly, the relations between Budapest, the capital, and the most distant parts of the kingdom. At first there were two zones for the suburban traffic, twelve zones for distances of from 25 to 225 kilometres (from 15.5 to 139.8 miles) (each including a uniform rate for all journeys within a rather extensive district, the successive stages being 15 or 25 kilometres [9.3 or 15.5 miles] apart), and finally a single zone, with a single rate, for all distances exceeding 225 kilometres (139.8 miles), the possible maximum being 800 kilometres (497 miles). There was formerly necessarily a break in the journey whenever one passed through Budapest. This tariff to some extent created traffic on very short and on very long distances; from 1888 to 1894, the traffic, on all the State lines and on the Austro-Hungarian Company bought up in 1891, had grown as follows:

	Number of passengers.	Receipts.
First zone and suburbs.....	650 per cent.	232 per cent.
Zones 2 to 12.....	40 "	10 "
Zones 13, 14 and 15.....	246 "	186 "

But when the long-distance traffic, which formerly had been practically nil, began to develop appreciably, it was soon found that the rates did not cover the corresponding expenses. In 1896 and 1903, the suburban rates were altered and two new zones were created, one of 75 (46.6 miles), the other of 100 kilometres (62.1 miles), so that the uniform rate was only reached at 400 kilometres (248.5 miles). Experience showed that these increases in no way affected the growth of the traffic.

Under these circumstances, the passenger traffic approximately covered its expenses, but yielded practically no net profit. On July 1, 1912, the zone tariff was abolished. The rates are now calculated (except in a few cases) by every 5 kilometres (3.1 miles) for distances less than 30 kilometres (18.6 miles), and by every 10 kilometres (6.2 miles) subsequently; the bases quickly decreasing at distances over 250 kilometres (155.4 miles). The gain expected from these increases in the rates in the new tariffs amounts to about 16 million francs (\$3,100,000), or 18 per cent of the preceding receipts.

One sees how contrary to fact the formerly universally accepted opinion, that the cost of railway transport could only fall, has become. In France, public opinion does not yet accept the idea that tariffs can ever be raised. However, the working results which we set forth every year in the May number of the *Revue*, lead us to fear that, as in all other countries, we shall have to face it. Between 1906 and 1912, the receipts of the main railroads have increased by about 350 million francs (\$68,000,000), and the working expenses by about 400 million francs (\$78,000,000), while the capital outlay has increased by about 2 milliard francs (\$390,000,000). As regards the increase in the expenses, the follies which came after the Western Railway had been bought up, account for about 50 million francs (\$9,700,000), besides the normal increase in the expenses which State operation has to face as much as company operation. Even if these 50 million francs are deducted, one finds that the increase in the expenses has absorbed the whole of the increase in the receipts. Now, in 1906, the coefficient of working was 52 per cent. The length of the new and poorly productive lines opened to traffic in the interval, on which the coefficient of working is necessarily higher than on old lines carrying much traffic, hardly exceeded 1,000 kilometres (621 miles). On the other hand, the extra traffic, on the old lines, would not have involved anything like a corresponding increase in the expenses, if the net cost of carriage had not become higher. At most, an increase in the ex-

penditure amounting to one half of the increase in the receipts would have been reasonable if the working conditions had not been seriously modified.

Among the modifications introduced in this interval, there are some which are real improvements, from the point of view of the speed and number of trains, the comfort of the carriages, etc. But the expenditures incurred in this connection by the administrations have probably not materially exceeded the economies due to technical progress: the use of more powerful locomotives making it possible to use heavier trains, the development of gravity sorting, etc. The enormous difference between the results observed and those which could reasonably have been expected from the development of the traffic is due above all to the general rise in prices, particularly that in wages.

But the intervention of the public authorities has contributed much towards this increase. We have repeatedly discussed the special legislation which ensures railway employees pensions which are much better than those the State gives to its employees proper, and are incomparably superior to those which law provides for workpeople generally, while the budget does not even contribute what it does in the case of all other workpeople. This legislation has increased the expenses of the operating administrations by 25 to 30 million francs (\$5,000,000 to 6,000,000) per year, which would have been far better spent on wages, not counting the 8 million francs (\$1,500,000) charged in 1912 to capital account, in order to apply to employees pensioned in that year the retroactive dispositions, and the slowly-decreasing sums will have to be added in subsequent years. The regulations relating to the work of the employees have also involved expenditure greater than that which would have resulted from the increases of staff made necessary by the general movement tending everywhere to increase the leisure time of the workers.

The act of 1905 relating to the liability of carriers has, on the other hand, also increased the expenditure of railways in the way of compensation, by about 15 million francs (\$3,000,000) per year. By rendering invalid the contractual clause which reduced the liability of carriers when reduced special rates were made, it much reduced the number of cases in which the court of appeal may exercise a control over the decision of judges of the lower courts. Now it must be admitted that these judges, elected as they are by the customers of the railways, are not always quite satisfactory to the latter. No doubt in the large cities, the commercial tribunals administer justice with

perfect impartiality. But they are less independent in less important centres; the more they are in direct contact with the traders, the more they are inclined to consider them as always in the right as against large enterprises foreign to the district. In this connection, the statistics of the results of the actions-at-law of one of our great railway companies, in 1910 and 1911, are singularly instructive. It must be noted that all these actions are undertaken and fought by the same legal department, which examines all cases from the same point of view and does not fight unless it thinks it has serious chances of winning. Now the proportion of cases it lost before the commercial tribunals is as follows:

In Paris.....	32.5 per cent
In other towns of more than 50,000 inhabitants.....	46.6 "
In towns of from 10,000 to 50,000 inhabitants.....	60.9 "
In towns of less than 10,000 inhabitants.....	80.0 "

When the act of 1905 struck out one of the conditions under which the companies voluntarily granted reduced rates, the government recognized that it could not compel them to maintain those reductions without compensation. The minister of public works has hence, as a nearly unique exception, this time authorized increases in certain tariffs, very small increases which were to be revised when the effects of the new legislation became apparent. But when that time came, the government brought all the pressure it could, to bear on the companies, to induce them to give up the increases which it was impossible to refuse to them, if they insisted on it. They finished by agreeing to it, subject to the condition that they should be compensated by the revision of some of the conditions in the tariffs, which are much more troublesome to the companies than profitable to the public. Then, as always, when it was a question of approving the clauses facilitating the railway service, the government once more put matters off, in consequence of representations made less by the great firms seriously interested in the question than by small bodies which are under the thumb of the agencies who push claims. Finally, the companies have received nothing in exchange for their consent to the maintenance of the special rates, even in the cases where the documents themselves proved that the clauses reducing the liability of the carrier had been one of the determining conditions of the reduction agreed to.

While the new working expenses more than absorb the increase in the receipts, the capital outlay increases and the corresponding capital charges increase at a still quicker rate The general increase

in the rate of interest has, during the last fifteen years, kept level with the increase in prices. Lately it is above all on the old investments of the fathers of families that that rise has reacted: the increased cost of living induces them to seek more remunerative investments; moreover, seeing the fiscal and other risks, which threaten wealth on all sides, the difference between what was formerly considered a gilt-edged security and other securities no longer seems so important. About fifteen years ago, the rate of interest (amortization included) at which the companies borrowed hardly exceeded 3.25 per cent; now they can no longer raise money without paying about 4 per cent. Moreover, amortization charges become heavier as the termination of the concessions approach, they increased the charges of the loans, fifteen years ago, by from 0.50 to 0.75 per cent; now this charge varies from 0.75 and 1.15 per cent, according to the length of time the concession of each individual railway still has to run; and it will increase very quickly unless measures are taken to make it possible to continue the supplementary works absolutely indispensable for the proper carrying out of the service.

Whether the increase in the capital charges and working expenses is a direct burden on the State, as regards its own railway system and the expenditure it has incurred in the construction of new lines, or whether it falls on companies with which the State is closely connected by the guarantee of interests and the sharing of profits, it nevertheless very seriously reacts on the budget. This is also affected in many other ways by the general rise in prices and wages, continually compelling it to increase the pay of all the staff engaged in public service, not only in order to please unions or combines which it would be easy to bring to reason, but because it becomes more and more difficult to recruit civil and military employees and will finally become impossible, if one does not pay them sufficiently well. The new military burdens which have become obligatory, the social burdens taken over, occasionally rather imprudently, are superimposed upon those which result from the natural upward trend of prices, so as to compel the State to raise fresh sums running to figures never previously attained, not even after the catastrophe of 1871. At a time when it is necessary to look in every direction for new taxes, it is no longer possible to discard, *a priori*, all idea of increasing the rates for transport.

PASSENGER RATES IN BRITISH COLUMBIA

BY H. C. DRAYTON, K. C., CHIEF COMMISSIONER.

FROM THE JUDGMENT OF THE BOARD OF RAILWAY COMMISSIONERS
FOR CANADA IN THE NORTHWEST RATE CASE.

At the hearing no evidence was put in dealing with recent statistics. The information which the Board then had was not such as would warrant a general rate revision. It was, however, suggested by Counsel that the Board would not in this case be limited by the evidence already given, but would, through the usual channel, that is, its Traffic Department, obtain all further statistics and information which might be necessary to do justice to the parties.

Mr. Hardwell has obtained further data, and his report on the question is as follows:

The standard maximum first class one-way passenger fare west of Macleod and Calgary is 4 cents a mile; east of those points it is 3 cents. Prior to 1901 the rate west of Calgary was 5 cents a mile.

By this judgment the standard maximum freight rates in British Columbia are fixed, approximately, at 30 per cent higher than the "Prairie" standard, the addition representing an approach to the added cost of operation in that province, as shown by the evidence. The higher passenger toll is, therefore, as close to the freight differential as circumstances permit, having regard to convenience and facility in obtaining tickets.

Statistics before the Board show that the operating expenses per mile of line on the British Columbia division are 22 per cent higher than the average for the entire line per mile of road, and upwards of 30 per cent higher than the average for the prairie divisions. The operating expenses per train mile on the British Columbia division are 54 per cent higher than for the entire line, and 47 per cent higher than on the prairie divisions.

Judged by these results the difference in the local passenger rate is not even sufficient to meet the greater expenses of carrying on the traffic.

Every class of expenditure is higher — the maintenance of way and structures being practically double that of the prairie divisions either on the mile of road basis or per train mile. Maintenance of equipment is only slightly higher, but transportation expenses are much higher, being 30 per cent higher per train mile on the British Columbia division.

It has been contended that the Canadian Pacific's passenger fare on the lakes of British Columbia should be lower than on its rail lines

in that province, and under normal traffic conditions this undoubtedly should be the case. Statistics, however, are not favorable to this proposition. Returns for the months of January, February, March, July, August and September, 1913, show that on the Arrow, Slocan, Kootenay and Trout Lakes 30,586 fares were collected, yielding an average of 74.3 cents per passenger; or a total passenger revenue of \$22,725.45. The facilities furnished are sufficient for a very much greater traffic.

For the year ending June 30, 1913, including the rail lines west of Kootenay Landing in the Kootenay and Boundary districts, also in this case, the traffic of Okanagan Lake, the total earnings were \$1,468,741, and the expenses \$1,667,171, showing an actual loss to the company on the services of \$198,430. Not only do these figures include the revenues on all freight and passenger traffic which both originated and terminated within the Kootenay and Boundary districts, but also the total receipts on through traffic which, starting in those districts, was carried through to eastern destinations, and the mileage proportion accruing to those districts on through traffic inbound. The statistics would be more illuminating, of course, were those of the rail and boats divided, but it appears that the company's accounts are not kept so as to make this segregation possible.

Statistics furnished in a former case, that of F. W. Godsall of Cowley, Alta., showed that on the same lakes during July, August and September, 1909, there were sold 12,932 tickets, producing \$10,691.05; an average of 82.67 cents per passenger. For the same months of 1911, the figures were 21,377 fares; earnings \$15,643.60; and the average per passenger 73.18 cents. While, therefore, the number of passengers increased, the average amount paid by each decreased, showing a lower average toll.

From the evidence and statistics presented, I am of the opinion that no action should be taken with respect to the passenger fare in British Columbia until the traffic shows better results.

While a parity of fares throughout the whole country is desirable, the exercise of the Board's jurisdiction in reducing rates cannot proceed on the isolated question of what would or would not be an advantageous rate to the public apart from all reference to the necessary expenses incurred in the service. While, as has already been pointed out, the method of accounting does not give British Columbia full credit for its earnings, so that in my view the deficit of \$198,430 resulting from operations in the Lake and Boundary districts would disappear, to a great extent, if not altogether, and an operating balance be shown, in any event the returns are not such as would enable the Board consistently to order any reduction in the maximum passenger toll.

The expenses here shown are those of operation and do not include any overhead expenses, such as taxes, insurance, or capital

charges. All these different matters would have to be considered and fair provision made for them before any reduction could be ordered. Large improvements are now under way, the effect of which should be to reduce considerably the cost of railway operation in British Columbia for which purpose they are being made, in order that the Canadian Pacific may carry traffic on more favorable conditions compared with the low grades that the Grand Trunk Pacific and Canadian Northern will have.

While my opinion is that the reduced cost flowing from the improvements on the line of the Canadian Pacific, and the construction of competing lines at better grades, will lead to a reduction of passenger rates in the near future, the situation at present, **in the light of today's returns and operating expenses, does not afford the slightest justification for directing a reduction in the passenger rate.**

Ottawa, April 6, 1914.

AN APPORTIONMENT OF EXPENSES TO SUBURBAN TRAFFIC*

FROM THE RAILWAY AGE GAZETTE.

An interesting segregation of expenses as between suburban traffic and through traffic passing over the same rails has recently been made by the Southern Pacific in connection with a case before the Railroad Commission of California, involving a proposed reduction of fares for its electric suburban service in Alameda County. The case also brought out some interesting evidence bearing on the question of the profitableness of suburban business, as the company undertook to show in statements presented by Mr. C. W. Durbrow, its attorney, that on the 877 suburban trains operated daily out of the Oakland and Alameda moles, in connection with the trans-bay ferry service, carrying nearly 14,000,000 passengers per year, the loss for the fiscal year ended June 30, 1913, approximated \$364,000, without taking into consideration interest on the investment, the valuation on which was placed at \$46,209,560.

The case was instituted by the residents of one of the suburban communities, who filed a complaint for the purpose of compelling the Southern Pacific to apply a uniform one-way rate of 10 c. to Stonehurst, which is 14.3 miles from San Francisco. The charge was made that the existing one-way rate of 15 c. and the commutation rate of \$5.00 per month was unreasonably high, and discriminatory in comparison with the uniform one-way rate of 10 c., and the \$3.00 monthly commutation rate charged to other points; for instance, to Melrose, on the same line, 10.8 miles from San Francisco.

The case naturally divided itself into two main branches, first, as to whether the rates were unreasonably high; and second, as to whether the rates were discriminatory. In justification of the reasonableness of the rates *per se*, comparative tables were introduced to show that the suburban rates out of San Francisco to Alameda County points are the lowest in the United States, and are much lower than the rates applying in and about New York, Philadelphia, Boston, Chicago, St. Louis, New Orleans, Los Angeles, Portland, Seattle and other cities, while in many instances the density of traffic in and about those cities is much greater than that out of San

* Synopsis of statement submitted to the Railroad Commission of California.

Francisco. Railway operating officials testified that the operating conditions were more onerous in San Francisco than in the East, and that the expenses were greater. In this connection tables were introduced showing that the expenses of conducting this suburban business exceeded the revenue derived therefrom by \$363,982.80 per annum, based on the actual figures for the 10 months, July 1, 1912, to April 30, 1913. One of the exhibits gave in detail the division of these expenses, which are summarized as follows:

REVENUES — RAIL AND WATER LINES.

Passenger.....	\$1,359,636.12
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EXPENSES — RAIL AND WATER LINES.

Maintenance of way and structures.....	190,349.52
Maintenance of equipment.....	130,937.88
Traffic expenses.....	.....
Transportation expenses.....	719,900.52
General expenses.....	18,974.52
Maintenance and operation of vessels, &c.....	609,071.04
Taxes.....	54,385.44
	<hr/>
	\$1,723,618.92
	<hr/>
Deficit.....	\$363,982.80

In this instance the accounts had been kept in such a manner as to enable the company to make a thoroughgoing division of the expense of conducting local passenger business. The manner in which the apportionments were made was shown graphically in a statement filed with the commission. Practically all the segregations were based on the actual expenditures, with the exception of the ferry expenses. The number of the passengers who traveled on these boats, in suburban and main line service, was determined, and it was found that 90.3 per cent of all passengers traveled between suburban points, the number of main line passengers being 1,462,321 for the fiscal year ending June 30, 1913, and the number of suburban passengers being 13,611,099. Under the ruling of the United States Supreme Court, in the Minnesota rate case, it was felt that the expense of conducting this business must be apportioned in accordance with the value of the use to which the facilities were put, and, therefore, 90.3 per cent of the expense of the ferry service was apportioned to the suburban business.

In determining what proportion of the railway-operating expense was properly chargeable to suburban business, the engineering, auditing, operating and traffic departments were instructed to

eliminate from consideration all items of expense which were common to main line and suburban business. For instance, a large passenger depot at the Sixteenth Street Station, Oakland, accommodates both main line and suburban trains. The expense of operating this depot was entirely eliminated, and its valuation was also left out of consideration in a valuation of the property used in suburban business, which was also made in connection with the case. In general, where facilities are used jointly in the two services, the expense thereof was entirely eliminated.

The memorandum of the method and bases used for arriving at the expense properly chargeable to suburban service, which was filed with the commission, describes in detail the methods or bases of division used for each class of expenditures under the accounts of maintenance of way and structures, maintenance of equipment, transportation expenses, general expenses, and maintenance and operation of vessels. Of 108 accounts included under these various heads, 72 could be divided on the basis of the absolute actual expenditures. In the accounts on which the division could not be so made, some of the principal variations in method were as follows:

Roadway tools and supplies.—Based on actual expense, according to section location, except sections consisting of both suburban and other tracks, which were apportioned on the basis of relative miles of track for territory involved. Sections containing tracks used both for suburban and other service were apportioned on the basis of number of passenger cars handled.

Bridges, trestles and culverts.—Based on actual expense, except that wages and expenses of bridge inspector were based on road mileage.

Roadway buildings.—If used by both through line and suburban basis, cars handled.

Station buildings and appurtenances.—Basis, cars handled.

Docks and wharves.—At Alameda mole, actual cost; at Oakland pier, basis, passenger cars handled.

Steam locomotive repairs.—Actual repairs to individual locomotives; running repairs, basis current month's mileage; shop repairs, basis of mileage made since in shop for the same or heavier class of repairs; accident repairs according to location or responsibility.

Water for road locomotives (steam suburban service).—Estimate furnished by mechanical department.

Lubricants for road locomotives.—Cost per mile for road locomotives applied to mileage of locomotives in suburban service.

Agents, clerks and attendants.—Relative service furnished each class of service where possible, otherwise basis of cars in and out of station.

Labor at stations.—In joint service, basis, cars handled.

Stations, heating and lighting.—In joint service, basis, cars handled.

Interlockers and block and other signal operations.—Junction points, based on number of functions serving each class of service.

Crossing flagmen and gatemen.—Actual, except junction points based on number of cars handled.

Depreciation of vessels.—Actual charge to individual vessels. Original cost less estimated salvage divided by entire estimated life.

Incidentals in ferry service.—Based on mileage of boats served.

Damage to boats owned by another company.— Actual, according to boat doing the damage.

Repairs to passenger wharves and slips.— Actual at Alameda mole; at Oakland pier, basis of passenger cars handled (65 per cent).

Rental.— Basis, passenger cars handled. Items assignable to through service excluded.

Under the showing made of an actual deficit in the operation of suburban service, it was unnecessary to show the value of the plant devoted to the suburban business but it was considered advisable to do so in order that the commission might be fully informed, and in order that it might determine what rates the company would be entitled to receive if allowed a reasonable return upon the investment. The value of the entire suburban system was shown with great detail, as determined by a minute and careful survey and measurement of the entire properties, including a computation of the amount of material in all structures and roadbed, to which were applied present cost prices. The reproduction value of the properties was shown to be \$46,209,560, and voluminous exhibits were introduced to sustain it.

ARE INCREASED TRAIN LOADS PRACTICABLE?*

BY CHARLES F. SPEARE.

The rising ratio of fixed operating costs to gross earnings has been the American railroad managers' nightmare for the past ten years, and particularly since 1908. In the decade expenses over which a railroad has only limited control and which are, in a degree, non-elastic, have expanded swifter than in any other similar period in railroad history. To meet this situation American ingenuity and efficiency have developed various counteractants, all summarized in the increased freight train load. In ten years the Mallet and mikado engine has passed from an experimental stage into general use; 90-lb. and 100-lb. rails have replaced previous 70 to 85-lb. standards and only a few wooden bridge structures are left standing on main lines. In the period from 1903 to 1912 (1913 figures not yet available) the train load of American railroads has gone from 391 tons to 509 tons, or 30 per cent, the tractive capacity of engines has increased from 22,796 pounds to 30,501 pounds, or 34 per cent, and the average capacity of freight cars has risen to 39½ tons, whereas it was 30.9 tons in 1903.

It is quite generally agreed that transportation costs are not likely to decline in the future, for the tendency of wages and fuel, the two largest items in transportation expense, is all the time tending upward. Demands for better service, greater safety, heavier equipment in passenger travel, stations of larger capacity requiring a greater number of railroad servants to operate them, all add their mite to swell the growing sum of costs from which a railroad gains nothing in equity for its shareholders.

Hence the query has been put: Will the railroads of this country be as well able in the next ten years to meet arbitrary increases in the cost of doing business as they have since 1903; in other words, is there still opportunity for counteracting higher costs through the agency of the larger train load? The answer to this will be found in the statements from railroad men themselves appearing later on in this article.

The inquiry from which the facts herein given were developed

* From the *Railway Age, Gazette*, April 10, 1914.

was addressed to the presidents and receivers of forty railroad systems in the United States. About 35 replies were obtained. In only one instance was the positive statement made that maximum tonnage capacity had been attained. A large majority of the presidents believe that there is still opportunity for a good addition to the train load on their lines. These men, however, incline to the opinion that the percentage of increase in the next five years will be considerably less than the rate of gain in the two five-year periods from 1903 to 1908 and from 1908 to the year just past.

Such conflict of ideas on the train load as exists centers in the tractive capacity of engines. Naturally those who are skeptical of a continuing increase in the load feel that the maximum of freight engine power has been reached in the larger type of Mallet and mikado engines now in service. This is true of roads where the drag tonnage predominates and where every mechanical facility has been provided to bring about the best train load results. There are, on the other hand, many systems with an unbalanced engine rating. On such lines enormous possibilities still exist for bringing up the load by discarding the light engines and replacing them with others of modern standards.

Where the subject of grades in reference to train loads was discussed it was the opinion that there are not throughout the United States many remaining grades that it would be profitable to reduce, after receiving the benefits of heaviest power practical for these divisions. The sentiment was also very pronounced that the maximum strength of track and bridges had been reached. That there is plenty of gain to be secured by lengthening out passing tracks to accommodate the longer trains relating to larger loads, was the almost unanimous expression. The question of future car capacity receives deserved attention. To a few of the railroad managers the freight car rather than the freight locomotive is to solve the future of the revenue train load.

Extracts of the opinions on this general subject as they have come to me through correspondence or in conversation with the men quoted, I give below:

E. P. RIPLEY. *Atchison, Topeka & Santa Fe.* Our customers demand time and at least one freight train must be run over practically every branch of the road every day, whether there is anything for it to haul or not, and in this fact you have one of the prime causes of our inability to load our freight trains to anything like a maximum when taken as a whole. The question of the amount of freight to

move and the time in which we are given to move it has more influence upon the train loading than most anything else in certain parts of the country, and applies to all roads in the West at least. I should place as the second factor in train loading the tractive capacity of engines and of draw-bar apparatus. The former has, I think, about reached its economic limit unless some other motive power is devised. The latter is also, I think, about at its maximum, although both of these, of course, depend largely on the grade line.

Mr. Ripley believes there should be a considerable increase in the Atchison train load over that obtained in 1913.

DANIEL WILLARD. Baltimore & Ohio. We expect to bring our average train load, including company freight, up to 700 tons, but I would not like to say just when we expect that to be accomplished.

It will be noted from the table in this article that the Baltimore & Ohio had a 50 per cent increase in loading between 1908 and 1913, most of which took place between 1910 and 1913.

MARK W. POTTER. Carolina, Clinchfield & Ohio. I am inclined to think we have about reached our maximum load, unless and until we can improve both the draw-bar and the air hose, or until some mechanical device can be worked out so as to insure the instantaneous setting of the brakes throughout the entire train in the event of trouble. It seems to me certain that railway equipment will be improved in the near future in all three respects, and I shall be very much surprised if, within the next two or three years, we are not hauling 200 cars where we are now hauling 100. Our bridges are all right and our side-track accommodations also for increased train loads and a more extensive use of pushers would furnish the power.

The 1913 revenue train load of the Clinchfield was 1,154 tons and its transportation cost by months has frequently been below 20 per cent of gross earnings.

GEORGE W. STEVENS. Chesapeake & Ohio. The capacity to increase train load has practically been reached on the main lines of this company, and while some further increase can still be expected, due to the acquisition of a number of large capacity locomotives that will, in the future, be placed in service, and the placing of these locomotives also on the heavy tonnage branches, yet it cannot be hoped that this increase will, in the next five years, exceed 15 per cent. In my opinion, the tractive capacity of locomotives, with the present development of the Mallet engine, has reached the economical stage. There will be further developments in the matter of heavy bridge structures, heavier track and greater side-track facilities, all of which will be worked out in the five-year period referred to.

Mr. Stevens sees in the legislative action limiting the number of cars per train a dangerous factor and an unknown quantity in the train load problem of the future.

S. M. FELTON. Chicago Great Western. We have about reached the limit unless we should make further grade reductions or purchase still heavier power or there is a marked change in the direction of traffic movement. The purchase of heavy power, large capacity cars and grade reductions since the reorganization in 1909 brought about the increase in the train load to which you refer.

DARIUS MILLER. Chicago, Burlington & Quincy. I do not feel that we have yet reached the limit of our train load, and hope that it will substantially increase during the next five-year period. Upon certain divisions, where the character and volume of traffic permits it, we are to-day handling trains of much heavier tonnage than these average figures, and it is evident, therefore, that the average figures have no direct relation to the tractive capacity of engines, strength of bridges, length of sidings, etc. . . . The only apparent limit to a continued increase in the average train load is the growth and the volume of business offered for transportation, and the financial ability of the company to improve its property and facilities in order to increase its train load. . . . I do not think that there is any limit yet apparent, which the ingenuity and ability of mechanical men cannot overcome, if the necessary money is provided and traffic in sufficient volume is found to justify the expenditure.

W. A. GARDNER. Chicago & North Western. There is no reason why we will not increase the North Western load at least 75 tons in the next five years, and, perhaps more. . . . We do not look for any particular increase in power or the capacity of cars. The greatest difficulty nowadays is to utilize the capacity of all sorts of equipment except coal carrying. It is not unlikely that some of the roads which have a very large coal tonnage will go to a 75, or even 100, ton car; it will have to be six-wheel trucks, however, instead of four.

Mr. Gardner thinks that state commissions and the Interstate Commerce Commission should raise the minimum car load. As an illustration of the difficulty of getting maximum train tonnage he cites the fact that the 300 cars of flour and mill stuff loaded at Minneapolis daily for the East could be compassed in 200 cars if loaded to full capacity.

H. U. MUDGE. Chicago, Rock Island & Pacific. On the Rock Island there is still opportunity for a considerable increase in the revenue train load from that obtained in 1913. I believe that the increase between 1913 and 1918 will be at least equal to that in the last five years, but this will depend largely upon the ability

of the company to finance grade revision work. The traffic on several of the important lines has now reached the volume to warrant these grade revisions. A large proportion of the Rock Island traffic is of that nature requiring expedited movement.

W. H. TRUESDALE. Delaware, Lackawanna & Western. I believe there is still opportunity on the D. L. & W. for an increase in the average freight train load over that of the year just passed, or any preceding year. I do not believe, however, that the percentage of increase during the next five years will be anything like as great as for the five-year period ending with December 31 last. It is my view that the average tractive capacity of all freight engines on our road will increase somewhat from year to year during the next five, or possibly ten, years. This will be due to the older and lighter engines of less tractive ability being gradually destroyed and the new ones will probably all be up to the most recent type of high tractive capacity of the freight engines purchased in the last two or three years. It is furthermore my belief that these later engines are practically of the highest capacity that it is likely the railroads will be able to use to advantage.

F. D. UNDERWOOD. Erie. It is not the purpose of the Erie Railroad to greatly increase the power of locomotives. It aims to make further progress in the loading of cars, and lessen empty car haulage. It has in view further grade reductions in Ohio and Pennsylvania, which, when completed, will develop heavier train tonnage. When the final grade reductions are had the Erie freight train load should average 800 tons of cargo. Mechanically there is yet room for more traction and stronger bridges.

C. H. MARKHAM. Illinois Central. I think it is a fact that the average tractive force of engines in service is capable of permitting a very considerable increase in train load for some years to come. We all have in service a comparatively large number of light capacity engines, and on the Illinois Central there are a large number of such engines which will be retired whenever the cost of repairs reaches a certain figure.

For the first half of the present fiscal year the Illinois Central train load has increased 5 per cent over the same period of the last fiscal year.

L. F. LOREE. Kansas City Southern. In my judgment there is reason to expect a gradual improvement in the revenue train load on the lines of this company in common with railroads generally. Under existing conditions it may amount, in the next few years, to some such figure as 20 or 25 per cent; in more favorable circumstances it might be greater. . . . It is from the revision of grades that most is to be expected. The effect of a change in grade, for example, from 1 per cent to $\frac{1}{2}$ of 1 per cent, is practically to double the potential freight train load.

E. PENNINGTON. Minneapolis, St. Paul & Sault Sainte Marie.

The large increase in 1908-1913 was due to an elimination of grades, acquisition of locomotives of greater tractive power and better terminal and line of road facilities. Further grade reductions on the line that will result in a larger train load have been deferred for financial reasons. Our standard freight engine with tractive effort of from 45,000 to 51,000 pounds is in my opinion the limit of tractive capacity so far as our line is concerned. This means a train load varying from 3,000 to 3,700 tons* on the different divisions.

C. E. SCHAFF. Missouri, Kansas & Texas. The increase in revenue train load during the next five years will depend largely upon our ability to replace the light engines with heavier power. Our plan is to replace all the main and heavy traffic lines of the Missouri, Kansas & Texas with heavy rail and heavier engines, and I think we ought to secure a 15 or 20 per cent increase in the revenue train load before 1918. Should there be a substantial increase in the northbound business our train load might increase 30 or 40 per cent.

B. F. BUSH. Denver & Rio Grande and Missouri Pacific. It is reasonable to assume that the revenue train load during the ensuing five years will equal the established ratio of increase and probably exceed it. Further improvement necessarily depends on the relative tonnage there may be to handle, increasing the length of passing tracks, purchase of other locomotives of a capacity that would further increase the average tractive power per engine, the installation of heavier bridges as needed, some further reduction of grades, and the double tracking of lines as the increase in the traffic warrants.

A. H. SMITH. New York Central Lines. It is possible to make further increase in the revenue train load on either the New York Central or the Lake Shore with the present standards of roadway and structure. The feasible lines of development along which such improvement may transpire are (a) efficiency of personnel; and (b) efficiency of equipment.

L. E. JOHNSON. Norfolk & Western. It is not only our belief but our positive knowledge that, on the Norfolk & Western, there is still opportunity for a considerable increase in the revenue train load over that obtained in 1913. We anticipate that there will be a decided increase between 1913 and 1918, but possibly not to the same extent as in the last five-year period. The limit in the tractive capacity of engines on the Norfolk & Western has practically been reached until such time as we can see our way clear to use a heavier than a 100-lb. rail.

Mr. Johnson, like Mr. Stevens of the Chesapeake & Ohio, thought legislation by trainmen might be a factor in limiting the future size of the train load.

*Gross weight behind the drawbar presumably—[Editor Age-Gazette].

J. M. HANNAFORD. Northern Pacific. It is my belief that on the Northern Pacific there remains but limited opportunity for any considerable increase in the revenue train load over that obtained in 1913. With the growth of traffic density and some improvements in grades and motive power a small increase may be made, but I anticipate it will be much less than the average for the ten years from 1903 to 1913.

HOWARD ELLIOTT. New York, New Haven & Hartford. There is room for considerable increase in the New Haven train load both through the introduction of heavier power and the lengthening out of many passing tracks. In the few months I have been with the system the load, under Mr. Hustis's direction, has been increased about 50 tons per train.

J. M. SCHOONMAKER. Pittsburgh & Lake Erie. It is unlikely we can materially increase our revenue train load in the future as we are approximately at the 100 per cent limit of power, bridges and track capacity, a point we have been reaching up to since we started this good work in 1906.

F. H. BRITTON. St. Louis Southwestern. It is my belief that the St. Louis Southwestern has still opportunity for a considerable increase in revenue train load. The ratio of increase will not be as great as in the past because we are gradually reaching the maximum tractive capacity of locomotives as well as the carrying capacity of freight cars. The class of freight handled has much to do with train load. Our merchandise shipments have increased considerably in the last few years. The handling of merchandise results in a reduction in the load per car, and competition and quick service usually result in a reduction in train loading.

W. J. HARAHAH. Seaboard Air Line. There is room for considerable improvement in the train load on this line, a large part of which will come, however, from the equalization of business, decreasing the percentage of empty cars handled. We have not reached the maximum tractive capacity of engines and there is opportunity for gain in the matter of bridge strength and side-track accommodations. The development of the Mallet engine and the mikado engine made a very great increase in tractive power which was not foreseen prior to the time that it occurred. So I believe, when the necessity for increased power arises, it will be taken care of in some feasible way.

JULIUS KRUTTSCHNITT. Southern Pacific. There is not much opportunity left on the Southern Pacific for increasing the train load by reducing grades. During Mr. Harriman's administration it was the policy to reduce grades and to use the engines of smaller capacity. Now larger capacity engines are required to make gains in train tonnage figures. In the maximum units of engines now in use I believe the limit of tractive capacity has about been reached, for

rails, bridges and the axle-bearing load are already under a very great strain. On the Southern Pacific an important factor in train tonnage is the increase in speed required by shippers. We are gradually trying to work up to a larger load even with the more difficult time schedule. Again the necessity for running mixed trains on branch lines cuts tonnage as, frequently, the train load on these branches will be only from 80 to 90 tons, against 700 tons on the main line. Car loading is still an undeveloped science, but it has its limitations owing to the long usage of certain units of car loads by shippers. Eventually the Southern Pacific ought to have a 450-ton train load.

FAIRFAX HARRISON. Southern Railway. There is a large opportunity for increased efficiency in respect to train tonnage. We have by no means reached our limit, even without the vast expenditure of capital necessary for revision of grade.

E. T. KEARNEY. Texas & Pacific. We have not reached our limit according to conditions for heavier tractive power. The present structures will accommodate the heavier engines. I anticipate that the tonnage load in the next five years will increase between 10 and 15 per cent. In the last six months gross tonnage per train has increased 20 per cent.

W. L. ROSS. Toledo, St. Louis & Western. By the expenditure of some money in eliminating a few curves and grades there could be made a showing during the next five years equal to the past. Lines situated as the Toledo, St. Louis & Western, handling miscellaneous traffic and serving a highly competitive territory, requiring a fixed amount of expedited freight service, are limited in train loading to the existing daily conditions.

RAYMOND DuPUY. Virginian Railway. The original program for the Virginian with its 0.2 per cent grade line on two of its operating divisions, was to handle 80 loaded 50-ton cars in a train. But we developed a mikado engine a little heavier than our first mikados, and equipped them with superheaters and now handle 100 cars per train as easily as 80 formerly. Our passing tracks were built for the 80-car trains. By lengthening them out to fit the longer trains hauled by the mikados we can increase tonnage over the low grade divisions by 25 per cent. Speaking generally Mr. DuPuy believes that the Mallet engine will be used more freely for road service and that this will raise the average train load. He finds much to criticize in the center sill construction of cars, which he believes is not strong enough. This opinion he justifies by a bad order record of less than 0.6 per cent for Virginian cars of special type, making a mileage of 12,000 miles per year and handling the heaviest train load in the country, against the normal average of "bad orders" of from 3 to 5 per cent.

HENRY MILLER. Wabash. There is still opportunity to increase the revenue train load on the Wabash, and as the record shows a consistent increase the past ten years, it is reasonable to suppose that the improvement will continue.

With such a strong jury so unanimously of the opinion that the increase in train loading will continue, it is conservative to place the probable average for the country by 1918 at from 575 to 600 tons per train.

What has been accomplished in the past decade is indicated in the following table, which shows the record of the different roads, including the percentage of gain from 1903 to 1908 and from 1908 to 1913:

	1913	1912	1911	1910	1908	1903	% Inc. 1913 over 1908	% Inc. 1908 over 1903
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.		
Atchison.....	310	317	310	295	287	280	8.01	2.50
Baltimore & Ohio.....	620	555	441	442	414	421	50.0	*1.66
Bessemer & Lake Erie..	...	1,038	989	1,007	931	943	....	*1.28
Canadian Pacific.....	381	372	336	340	291	252	31.0	15.6
Chesapeake & Ohio.....	843	756	656	701	621	473	31.8	26.1
Chicago & Alton.....	491	434	414	396	441	361	11.3	22.8
Chicago Gt. Western...	450	400	369	302	276	277	63.1	....
Chi. Burl. & Quincy....	484	437	406	381	384	271	26.1	41.6
Chi. Mil. & St. Paul....	357	308	290	281	274	240	30.7	14.1
Chi. & North Western..	348	299	277	260	262	231	33.1	13.4
Clinchfield.....	1,154	1,059	861	...	...	...	*34.1	....
Delaware & Hudson....	...	502	467	432	398	393	....	....
Del. Lack. & West.....	660	602	584	567	484	443	32.5	9.25
Denver & Rio Grande...	305	272	265	265	246	205	24.0	20.5
Duluth & Iron Range...	...	...	...	...	...	...	....	....
Erie.....	597	527	521	495	465	406	28.4	14.6
Great Northern.....	635	601	524	518	510	447	24.5	14.2
Illinois Central.....	407	356	358	364	352	288	15.7	22.5
Kan. City Southern....	520	413	380	361	318	255	63.0	24.7
Lake Shore.....	...	693	634	594	586	615	....	*4.71
Lehigh Valley.....	599	566	544	542	530	486	13.0	9.06
Lou. & Nashville.....	295	285	276	278	234	231	26.0	1.30
Mo. Kan. & Texas.....	243	241	225	216	219	211	11.0	3.80
Missouri Pacific.....	373	333	291	294	285	302	30.8	*5.66
New York Central.....	...	465	430	417	384	368	....	4.35
New Haven.....	291	292	290	293	243	218	19.8	11.5
N. Y. Ont. & West.....	308	292	296	270	265	287	16.2	*7.66
Norfolk & Western....	764	692	643	635	571	486	33.9	17.5
Northern Pacific.....	542	511	461	429	431	326	25.9	32.2
Pennsylvania.....	719	686	671	649	602	527	19.5	14.2
Pitts. Cin. C. & St. L..	...	462	418	385	338	310	....	9.0
Pitts. & Lake Erie.....	1,241	1,215	1,159	1,207	1,058	951	17.2	11.2
Rock Island.....	297	278	270	259	255	189	16.5	34.7
Seaboard Air Line.....	246	257	220	223	186	176	32.2	5.68
St. Lou. & San Fran....	281	255	221	223	212	195	32.5	8.70
St. L. Southwestern....	300	292	268	283	262	205	14.6	27.3
Southern Pacific.....	389	382	397	396	334	257	16.4	30.0
Southern Railway.....	260	250	241	237	195	188	33.3	3.68
Texas Pacific.....	230	218	219	222	221	207	10.0	6.75
Tol. St. L. & West....	492	412	451	481	465	296	5.90	57.1
Union Pacific.....	437	425	441	452	430	345	1.62	24.6
Virginian.....	1,392	1,132	1,049	755	...	...	84.2	....
Wabash.....	395	358	344	353	361	302	9.50	19.6
Wheel. & Lake Erie....	789	740	680	640	612	400	28.9	53.0
Wisconsin Central.....	422	396	340	354	291	304	45.1	*4.31

* Decrease.

NATIONALIZATION OF RAILWAYS: HISTORICAL ASPECTS*

BY DIXON H. DAVIES.

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There is not in the principles of English institutions anything to account for the fact that in this country, in contradistinction to the rest of Europe, the whole of the railways are in private ownership. On the contrary, the customs of the Anglo-Saxons, those stern restricters of the functions of government, contain the most definite sanction for making the provision of communications a public charge. The maintenance of the highways was ranked with the repulsion of invasion, and the ransoming of the Sovereign as the *Trinoda Necessitas* of public burden. It is true that at a very early date that saving vice of Anglo-Saxon collectivism, inefficiency, supervened, and the excellent network of military roads traced by the Romans became so overgrown and foundrous that it was hardly possible to discover the track even of the trunk lines, and in the early Plantagenet days posts were ordered to be set up at convenient intervals along the main roads, to each of which a horse was tethered, so that the King's messengers might ride from post to post changing horses as they proceeded. Thus was established a system of governmental communications which all other nations not only copied from us, but by their adoption of its English name paid unconscious homage to our position as the pioneers of the transport industry.

But beyond establishing a few horse posts, Government did little or nothing for the communications of the country, and by the time wheeled traffic came into general vogue, the roads had sunk to mere bridle paths, and protests rose loud and frequent from all parts of the kingdom; amongst these was a petition to Parliament from Nottinghamshire that one of the main roads was so narrow in places that two pack-horses could not pass each other. Pack-horses continued to be the principal mode of transport, down at all events to the middle of the eighteenth century, their convenience being that where the road was foundrous they could take advantage of the

* From a paper read in January, 1907, before the Great Central Railway Debating Society at Nottingham, reprinted in the Jubilee Number of the *Railway News*, 1914.

common-law right and deviate from the highway on to the adjoining lands. In Smollett's novel of "Roderick Random," his hero leaves Glasgow for London in 1739 between the panniers of a pack-horse, there being no other regular means of communication, between Scotland and England at that time.

The cost of transport was naturally prohibitive. What was called a fast van from Manchester to London charged £20 (\$100) a ton. The incredible condition of poverty and backwardness of the interior of the country which prevailed at this time demonstrates the degree to which civilization is dependent on transport. In Southey's "Doctor" it is stated that in hundreds of English villages at the end of the eighteenth century, cotton and sugar were unknown commodities, and even the potato had not yet penetrated. In 1790 Robert Owen pulled half a sovereign from his purse to pay a toll on the main road between Glasgow and Lanarkshire. The pikeman refused to take it, having never seen gold money before!

The scandal of this state of things was pressed upon Parliament, but when they proposed to lay out public money on the roads they were met with strong opposition by those who profited by the absence of competition that resulted. There is, for instance, on the rolls of Parliament a petition by the market gardeners of Hammersmith, protesting that the proposed improvement of the Western Road would deprive them of their natural advantage in the London market which they claimed to enjoy as a right — a petition, which to those accustomed to the arguments railway men have to face nowadays, has a ring of familiarity.

Thus early did the difficulty of adjusting public enterprise with the conflicting interests of different localities make itself felt, and thus early was the solution of the difficulty found by a resort to private initiative. The highways were handed over to the private control of the turnpike trusts, who quickly reduced the chaos to something like order. It was not perfect, but compared with the state of things which preceded it, the improvement seemed a marvelous revolution. State ownership, represented by the Post Office, was immediately left hopelessly behind, and the post was reputed the slowest as well as the most precarious means of communication. It was little used. In 1740 there were only three posts a week between London and Edinburgh, and on one occasion it is recorded that the post carried only one letter. It was not till 1734 that the Post Office could be persuaded to send the mails by coach.

The attitude of State resistance to improvement should not sur-

prise us. It is only what is to be expected of governmental institutions, at all events in a democratic country, for **all the government of a democracy can do, at its best, is to reflect the views of the majority.** Industrial advance has never proceeded from the majority; its source is always the brain of one man or a few men who manage to persuade one or two others to believe in their invention, which they proceed to carry out amidst the scorn of the rest of the world. This was the history of the introduction of railways. Pease and Stephenson were almost alone until they demonstrated the practical success of railways, made money for themselves and afterwards for their friends, who had thought they were mad, but were glad enough to come in and share when they saw prosperity. **Parliament abused and oppressed the railways, exposed them to the pillage of greedy landowners,** and subjected them to the necessity of bridging so as to maintain the existing imperfect public and farm roads without interruption, thus forcing them to an artificial level above or below the surface, an obligation which, more than anything else, accounts for the huge capital expenditure — some three times the average cost of railways abroad. But notwithstanding unfair exactions, and not a little ill-natured opposition, the railway makers grew and prospered. Not content with providing lines at home, their equipment and resources became so developed that, as the demand arose in other countries for the new system, they were the people who got the business to make them, and so they built up, as contractors, as engineers, as locomotive and carriage builders, or manufacturers of plant of all kinds, as financiers or as mere investors, **that vast aggregate of small fortunes from which have mainly been drawn the unfailing supplies of wealth for the prodigious, and apparently insatiable requirements of the railway system.**

Let us turn for a moment to the history of foreign road-making; in this respect there can be no question that countries on the Continent were greatly in advance of Great Britain. Numerous causes, partly dynastic, partly religious, partly territorial — perhaps more than anything else racial — had moulded the social institutions of the Continent upon a system of centralization, a system which, taking no account of local objections, and having for its ideal national completeness, certainly had the advantage of furnishing the country with a complete network of splendid roads. The system was no more capable of invention than was democracy, but it had the further disadvantage that it did not give the same opportunity of progress to its citizens. The whole of the national life was cribbed, cabined and confined by a rigid system of regimentation, which spread the

net of bureaucratic routine over the social life, and restrained the energies of the people in the arena of industry, as effectively as the movements of their feudal ancestors were hampered by their plate armor on the field of battle. To the powers that were in such a state of society the railway, leveling in its democratic advance strongholds of privilege and prejudice, was not altogether a welcome change, but economic reforms cannot long be resisted; railways had to come. The question was where was the money for such industrial improvements to be found? Napoleon had inquired of financiers, who had humbly told him that he could not manipulate millions with the ease with which he was accustomed to manœuvre battalions. Abroad there were no small fortunes in the hands of a large commercial class; the people had not had the opportunity of developing industrial enterprise that our people had. While the French were engaged in cutting off the head of their despot, we (having achieved that curative operation some century and a half earlier) were beginning the Great Central Railway. Perhaps it is not generally known that the earliest part of that Company's system, viz., the Peak Forest, was commenced in the year 1789, the year in which the Bastille fell. By this and similar enterprises our people had long been trained to take their courage in their hands, and face large commercial adventures by voluntary co-operation, and without dreaming of State assistance; and at the dawn of the railway there was already in Great Britain an army of small capitalists from whom the railway makers could recruit their pioneer ranks. **But the small capitalist did not exist to anything like the same extent in foreign countries at the time when railways began, and his absence is the real reason why so many of the Continental railways started under national auspices. The State had to make them because there was no one else who could or who would find the means.**

It should be borne in mind with pride that England is the only country in the world that has not in one form or another given State aid to railways. It would be a mistake to suppose that relief from public indebtedness is the only benefit that has resulted from this unique circumstance; perhaps a greater advantage is the automatic proportioning of effort to demand which results naturally from commercial control. If there is the public purse to draw upon, how are the projectors to fix the limit? They may either overdo the provision, as was certainly the case in the United States, where, in order to earn the public grants of land or money, the railways were pushed out in advance of the population, and led to widespread overtrading and

ruin; or they may lag behind the demand which would appeal to commercial people.

Commercial control, on the other hand, operates like the governor of an engine; if it has developed a pace beyond the necessities of the load, the steam (that is to say the capital resources) is cut off by the resulting discontent of the shareholders; if it falls short of the occasion the unserved demand offers attractions which quickly draw capital and proportionately induce expansion; thus the machine neither races nor lags, overtrading is checked, insensibly and naturally, and undertrading is overtaken.

* * *

There are, however, certain advantages which are commonly claimed for State Railways. It is said they serve military purposes better, but whether they do so or not must depend upon whether the State is capable of providing a system sufficiently well spread and well equipped. In this country, for instance, it is difficult to conceive how, on the top of other demands for public expenditure it would have been possible for the Government to have furnished the sum of thirteen hundred millions (nearly \$6,500,000,000) which commercial people have laid out upon our railways. This vast sum is itself the creation of free industry, and **to a very large extent the creation of the railways which have thus themselves provided for their own growth and subsistence.** As to the management of the railways for military purposes, those who studied the history of the South African campaign formed the opinion that the transport operation achieved by the privately owned railways, and privately owned ships, was the most creditably performed part of the whole business. Another advantage of national railways which is thought a great deal of in foreign countries, where it is the ambition of every citizen to become an official, is that the system lends itself to enormous bureaucratic aggrandizement. This is a characteristic, however, on which English people are not disposed to place a very high valuation.

Still another merit claimed by some is that national railways contribute to the revenue of the State. It is exceedingly doubtful whether they could be made to do so in England, for the reason that the profit of a public undertaking, whether it be a State railway or a municipal gas works, is not really a profit but a tax. As it is a principle of this country that people should be equally taxed according to their means it is not likely that the men of business, who furnish the principal traffic to the railways, would consent to have conveyance charges maintained against them for the sake of relieving the burden of the

tax payer at large. Again, revenue derived indirectly, in this manner relieves the Government from the check of the purse strings, which it is the function of the House of Commons to exert upon them. If our Ministers had, like those of Prussia, a source of revenue equivalent to half the national expenditure which did not require to be voted in Committee of Ways and Means, the power of the House of Commons would be a very different thing from what it is to-day.

Still another claim is made for State railways; it is that they rest on a system of uniformity and simplicity of rates. It is true that this is the tendency and in theory at least the primary basis on which State ownership proceeds. Herr Von Miquel, the Minister of Finance, stated in the Prussian Diet of 1894 "that it would prove impossible to retain the State ownership of the railways in Prussia unless it should be practicable to make rates in accordance with hard and fast rules, such as those based upon cost of service. It would be impossible," he said, "to make rates for particular occasions to meet the needs of those occasions; for rates made in that manner were arbitrary, and exposed the Government to the suspicion and to the open charge of favoring one district or trade and handicapping another." This talk of equable rates is mere fiction from the politicians' theories, as I shall shortly show.

The Railway Ministers of all countries, republican France, military Germany, autocratic Russia, democratic Switzerland, constitutional Italy, monarchic Austria, profess that if railways are to be national, rates must be stereotyped, rigid, incapable of adjustment and removed by their mathematical simplicity beyond the range of discussion. It is well to observe, however, that the theory of uniform rates was not the cause of State railways abroad, but the political result of nationalization.

The economic error which underlies such views is very clearly set forth in the following extracts from the Report of the Interstate Commerce Commission of the United States (Vol. I. 1888, p. 303)

It was very early in the history of railroads perceived that if these agencies of commerce were to accomplish the greatest practicable good, the charges for the transportation of different articles of freight could not be apportioned among such articles by reference to the cost of transporting them severally; **for this, if the apportionment of cost were possible, would restrict within very narrow limits the commerce in articles whose bulk or weight was large as compared with their value.**

On the system of apportioning the charges strictly to the cost, some kinds of commerce which have been very useful to the country,

and have tended greatly to bring its different sections into more intimate business and social relations, could never have grown to any considerable magnitude, and in some cases could not have existed at all, for the simple reason that the value at the place of delivery would not be equal to the purchase price with the transportation added. The traffic would thus be precluded, because the charge for carriage would be greater than it could bear. On the other hand, the rates for the carriage of articles which within small bulk or weight concentrate great value would on that system of making them be absurdly low; low when compared to the value of the articles, and perhaps not less so when the comparison was with the value of the services in transporting them.

It was, therefore, seen not to be unjust to apportion the whole cost of service among all the articles transported upon a basis that should consider the relative value of the service more than the relative cost of carriage. Such method of apportionment would be best for the country, because it would enlarge commerce and extend communication; it would be best for the railroads because it would build up a large business, and it would not be unjust to property owners, who would thus be made to pay in some proportion to benefit received. Such a system of rate-making would in principle approximate taxation; the value of the article carried being the most important element in determining what shall be paid upon it.

The public interest is best served when the rates are so apportioned as to encourage the largest practicable exchange of products between different sections of our country and with foreign countries; and this can only be done by making value an important consideration, and by placing upon higher classes of freight some share of the burden that on a relatively equal apportionment, if service alone were considered, would fall upon those of less value. With this method of arranging tariffs little fault is found, and perhaps none at all by persons who consider the subject from the standpoint of public interest. Indeed, in the complaints thus far made to the Commission little fault has been found with the principles on which tariffs for the transportation of freights are professedly arranged, while applications of those principles in particular cases have been complained of frequently and very earnestly.

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It seems to be overlooked by public men when they make speeches sympathizing with these aggrieved traders that the class of complaint most frequently received by the Board of Trade is an appeal for particular rates to special traders and places, which, if granted (and that is why they are asked) would place the petitioning trader or locality at an unfair advantage with other persons and places with which competition under normal circumstances is not economically possible, and that is why so few of these complaints ever see the light of day in the Railway Commissioners Court. They would not stand scrutiny

for a moment. The last volume of the Railway and Canal cases, which covers three years, only contains eighteen cases. No doubt there were others which the reporters did not consider of sufficient importance to record, but, having regard to the magnitude and ubiquity of the daily railway transactions, it may be doubted whether any branch of commerce has ever been conducted with so much ease and so little litigation.

The cry which reaches the politician is that the companies are using their power as monopolists to oppress the trader. This generally involves a double pretence; **first, the party complaining is not the public, but a trader masquerading in the clothes of the public; secondly, what is complained of is not the action of the Company as a monopolist, but the reverse — that is to say, its competitive activity.** Take the case of the complaint that the South-Western Company were carrying American meat from Southampton to London at lower rates than home-fed beef. When the case reached the Commissioners Court, that tribunal found that the complainants, though nominally an association of traders, were in fact one of the London dock companies, who were suffering because the land carriage of the Railway Company was proving itself more efficient than the sea carriage up the Channel, and thus diverting, by its competitive superiority, the traffic from the longer sea route, to the disadvantage of no human being except the dock proprietors.

Can anyone doubt that, to introduce railway affairs into the domain of politics in England, would be not only to cripple the railways, but also to compel members of Parliament to become more and more the bargaining tools of their constituents, and so (as Burke foretold) “infallibly to degrade the national representation into a confused and scuffling bustle of local agency?”

Anything that should clip the wings of the railways would inevitably injure trade at large. The condition of the country before it had good internal communication shows, what, indeed, has long been known, that there does not exist any force so potent for good or evil in commercial economy as transport. In this country the bulk of the trade is carried under special rates arrived at by special bargaining between the trader and the company. A Midland General Manager has stated that he has upwards of 30,000,000 of such rates. Special rates are most difficult to obtain with national railways. What would their deprival mean to the course of trade here? Simply that the free energies of the railway man, co-operating with the trader in hundreds of millions of transactions every year, would cease to

operate. What is the aim of the railway men in exerting themselves in this way? It is to promote movement — to find out a price at which business can be done, to fix terms, as to credit, and so on, which can wisely be made, and so to generate traffic and to make commerce flow. How could State officials undertake such duties? They involve sagacity, initiative, zeal, commercial motive, spirit of adventure, traits notoriously absent from the official mind, and yet of vital importance to the promotion and maintenance of business. **Commercial railways mean the continual removal of natural obstacles, until all districts of the country are brought into competition with each other as nearly as possible on equal terms, thus continually cheapening commodities and improving production.** National railways mean the perpetuation of such obstacles in order to preserve what are called the geographical advantages of each district — **in fact, commercial railways mean progress, national railways stagnation** — who can measure the difference?

But it is said that employees will be better off. But one force which workmen rely on to keep up wages is the ultimate resort of a strike, while for a public servant to strike means rebellion. Even in democratic Australia the laws against strikes by railway men are drastic. In fact, under national railways railwaymen take a lower standing. They cease to be independent citizens (even losing the franchise in several democratic countries), and they exchange voluntary for compulsory labor.

* * *

There is yet another class to be considered. The owners of railway property. These might easily be better off than they are now. They have never had a reward at all commensurate with their splendid sacrifices, with the magnificent success of their adventure and the immeasurable benefits which it has conferred on all classes of their fellow-countrymen. They have not even received the meed of public gratitude. On the contrary, their undertakings are exposed to the ill-natured vilification of every ignorant busybody, and made the cockshy of every advertising politician, who, prevented by law from bribing his constituents out of his own pocket, now seeks to do so out of those of the railway shareholders. It would not be wonderful if a feeling should arise amongst railway proprietors that they have stood the sort of thing long enough, and that if the country did not know when it was well off, why should they teach it and suffer in the process? "Let the nation pay us off," they might say, "and then we can invest the capital in some other country where it will be free from the

danger of vote-catching politicians, whose pillaging hand knows no restraint either of justice or patriotism." Railwaymen are called upon by the chivalrous duty which they owe to these proprietors, the bulk of whom are holders of only small sums, often the investment of hard-earned savings, and the sole stay of the widow and the orphan, to make a firm stand against this unsound and discreditable tendency of the public mind to oppress railway property. We should do our part to form an honest public opinion and to awake the conscience of the country to realize that justice, after all, is the greatest interest of a nation.

The more you examine these projects of State industry the more do their conditions appear to offend against the genius of Anglo-Saxon institutions. Whatever may be the prizes of such schemes, depend upon it they are not for us. Other nations, trained through the practice of many generations to a system of centralized control, so that each man takes his rank subordinated in its due place to his superior, may, through that system, manage their general domestic affairs well enough, but place them in a situation where they have not the accustomed formation to support them, and where are they? The repeated failure of the colonizing schemes is a sufficient answer. It is because our race has steadily resisted such artificial aids, and has looked on the State as a mother to honor and to work for, and not a cow to suck at, has brought up its children in habits of self-reliance, independence, and individual strength of character, that it has been given to us, as to none other of the sons of Adam, to lay hold upon that high inheritance of man, "to possess the earth and subdue it."

THE STATE AND THE RAILWAYS

From the *London Spectator*, January 10, 1914.

The railway strike in South Africa will perhaps help to arouse English public opinion to the serious dangers attending railway nationalization. So far from State ownership leading to universal content on the part of employees, the experience of South Africa shows that men employed by the State are more difficult to handle than men employed by private companies. The particular cause of the dispute in South Africa further shows how seriously national finances may be embarrassed by railway nationalization. The whole trouble in South Africa arises from the desire of the Government to reduce railway expenditure. A Committee examined the question in 1912, and reported, *inter alia*, that the railway workshops were overstaffed to the extent of 1,750 men. A little later it was discovered that railway receipts were falling short of official estimates. The Government therefore decided to get rid of some of their superfluous employees. But instead of discharging the 1,750 men, notice has only been given to 70 persons out of a total European staff amounting approximately to 35,000 men. It is as a result of this notice that a strike has been declared. It will be interesting to see what defence English Socialists and nationalizers can make for such a proceeding on the part of the employees of the State, or what guarantee they can give that State employees in England would not equally claim that the railway system must be treated as a milch cow for their private benefit, and not as a public service to the community.

The whole question of railway nationalization has been dealt with in a series of useful articles in the jubilee number of the **Railway News**, just received. The editors of this substantial volume, which is primarily intended to put on record the progress made in the past fifty years, have very wisely also looked to the future, and here place before the public some very pertinent considerations with regard to the risks attendant upon railway nationalization. We select a few of the points noted in this series of articles. First, it is interesting to see how the experience of other countries confirms that of South Africa with regard to the redundancy of employees under State management. For example, when the French Chemin de fer de l'Ouest was taken over in December, 1908, by the State,

there was 1,526 employees engaged in the central administration. By 1911 this number had risen to 2,587. As a particular illustration of the way in which the State multiplies functionaries, it is recorded that at Caen the preparation of the pay-sheets, which under the **régimé** of the company used to take nine persons three days, under the rule of the State takes twelve persons six days. This is a point which should be borne in mind when the advocates of railway nationalization talk about the wasteful administration entailed by the existing multiplicity of independent companies. For example, one writer in favor of nationalization says that under State ownership in the United Kingdom, instead of 250 general managers, only one would be needed. The idea that one man could discharge the duties for which independent railway companies, working to make a profit, find it worth while to pay good salaries to 250 men, is a sample of the foolishness which passes for argument. Even if the whole railway system of the kingdom were centralized under one railway head, as the Post Office is centralized under one Postmaster-General, it would be necessary for this great panjandrum to have at his beck and call hundreds of subordinate officials to supply him with information, and the experience of every State railway shows that the salaries of these officials would far exceed the aggregate sums spent by the independent railway companies on their general managers and administrative staff.

A more general point to which attention is too seldom directed is the lack of elasticity which invariably attends State management. The ideal of the bureaucrat is always to have a uniform rule; it saves him the trouble of thinking. In railway management that is impossible. Railway business can only be carried on by meeting the wishes of customers in details affecting millions of transactions in the course of the year. For this purpose subordinate officials of the railway companies are properly left with a good deal of liberty. Unless the State were to alter all its traditions, this would be impossible under State management. The tendency of the State would be to try to establish a uniform rule for freight charges based upon cost of carriage; but experience has clearly shown that no such system is workable, and all private railway companies have, in the interests of the public no less than in the interests of their own shareholders, adopted the practice of charging what the traffic will bear, and this involves the necessity for fixing special rates as special conditions daily arise. Unless the carrier is able to bargain with the trader there may be no trade at all.

It is inconceivable that the State could create any organization sufficiently delicate to bargain on commercial terms with potential customers, anxious to establish a particular line of business and requiring special concessions to make that possible. On the other hand, there is a grave danger that if the State admitted the necessity for departing from the bureaucratic principle of a uniform rate, its tendency would be to fix special rates, not on commercial principles, but in obedience to political pressure. This is one of the many evils with which the South African State railways have been afflicted. Sir Thomas Price, who was formerly general manager of the Cape Government railways, on resigning his office placed on record the fact^f that public authorities and influential persons constantly brought political pressure to bear to secure concessions which the general manager in the conscientious discharge of his duties ought to refuse. He added significantly that Members of Parliament act in the same way in the interests of their constituents, and that concessions made to this form of pressure not infrequently coincided with critical divisions in Parliament. That we in the United Kingdom should not escape from this form of public corruption is sufficiently clear from the way in which the Post Office employees habitually bring pressure to bear upon Members of Parliament to secure higher rates of wages. Even in Switzerland, where democratic government has been far more successful, because more honest, than in any other part of the world, this kind of political pressure is not unknown.

THE EXPERIENCE OF SWITZERLAND.

A very interesting review of the experience of Switzerland since the Federation bought up the railways of the country has recently been published in the December **Bulletin** of the Comité Central Industriel de Belgique. The special value of this Belgian article lies in the fact that the statements made are all based on official or other authoritative documents to which reference is given. It was in 1897 that the Federal Ministry put forward the proposal that the Federation should buy the railways, and the purchase of most of the lines was completed by 1902. The Gothard line was only acquired in 1909. One of the first disillusionments of the Swiss people was with regard to the purchase price, which exceeded in the aggregate by 35 per cent the original estimate. In Switzerland, again, one of the promises held out was a reduction of administrative expenses owing to the suppression of the independent companies. The Federal

Ministry estimates that 600 employees would suffice for the central administration, as compared with 880 whom the individual companies were employing. As a matter of fact, by 1912 the number of employees in the central administration had risen to 1,001, and instead of an economy of 600,000 francs, as had been anticipated, there was an increased annual expenditure of 1,700,000 francs. In the same way, the number of the subordinate employees increased from 26,000 in 1903 under the companies to 36,000 in 1909 under the State. The Swiss Government further prophesied that by buying up the railways it would be able to give better service to the public at lower rates. This prophecy, again, has not been fulfilled, and recently the Government has found it necessary to increase the rates charged in order to make the accounts balance. In effect, the State began by reducing the charges to the lowest rates which any of the companies had been charging, which was, of course, a benefit to those districts previously paying higher rates. It has now been discovered that this policy cannot be maintained, and the rates have had to be raised again. In the same way, there were large promises of improved passenger services; but after a very short time the Minister responsible for the railways was obliged to protest publicly against the insatiable demand of the public for train services which could not be profitable. As regards the employees, Switzerland has experienced something of the same sort of trouble, but on a less serious scale, as that of South Africa. Railway servants, now that they are employed by the Government, are constantly complaining of the conditions of their service, and bitterly alleging that none of the promises made to them before the purchase took place have been redeemed.

Finally, there arises the very important question of the independence of Swiss railways from foreign control. This was one of the points which served as the basis for an appeal to Swiss patriotism in support of the project for nationalization. It was alleged that the capital of Swiss railway companies was largely in the hands of foreigners, and that in consequence the independence of Switzerland was at stake. The history of the acquisition of the Gothard Railway has finally disposed of this argument. That Railway was originally constructed subject to certain international agreements between Switzerland on the one hand and Germany and Italy on the other. The Swiss Government when it acquired the railway was apparently under the impression that it could ignore these agreements; but as the result of a somewhat heated diplomatic controversy Switzerland has been obliged to enter into a new agreement with her

two powerful neighbors which affects the rates not only on the Gothard Railway originally involved, but on the whole system of Swiss Federal railways; so that from the railway point of view Switzerland is now far more under foreign control than she was before she acquired the property of the railway companies.

There is no space here to enter in detail into the difficulties attending the actual raising of the capital with which to acquire such a gigantic railway system as that of the United Kingdom. The purchase price has been put at anything from £1,400,000,000 to £1,700,000,000, and it is perfectly certain that the operation of raising this sum, or of converting private railway debt into public railway bonds, would have the most disastrous influence on the price of Consols, and therefore on our national credit.

GOVERNMENT OWNERSHIP OF RAILWAYS*

BY SAMUEL O. DUNN

Editor of the *Railway Age Gazette*

The effect of every public policy is a resultant of the action and reaction between it and the general conditions under which it is carried out. It is difficult enough to anticipate the future effects of a public policy that has been and is being followed under a known set of conditions. But in that case we can, to a large extent, judge of the future by the present and past. It is very much more difficult to foresee the various consequences of trying a wholly different policy under the same set of conditions, for then we can only vaguely and uncertainly anticipate the action and reaction of the new policy and the conditions on one another. Ordinarily, therefore, there is much less danger of a capital mistake being made by adhering to, but perhaps also steadily developing and strengthening, a policy that has been followed with some success under given conditions than by trying a wholly different policy under those conditions; and, consequently, it requires less evidence in the court of reason to justify adhering to an existing policy than to justify adopting a new and wholly different one.

It follows that in countries where government ownership and management of railways have been tried with some success, the burden of proving that a change should be made to private ownership and management, clearly rests on those who advocate the change. It likewise follows that in countries where private ownership and management have been tried with considerable success, the burden of proving that the adoption of public ownership and management is desirable, clearly rests on those who advocate the change to public ownership and management.

The main standards by which to measure the results to a nation of the railway policy that has been followed by it are, the economy with which its railways have been managed, the adequacy and quality of the service rendered, the rates charged, the financial gains

* Being the concluding chapter of "Government Ownership of Railways" by Samuel O. Dunn. Copyright, 1913, by D. Appleton and Company, New York and London, by permission of the publishers.

made or losses suffered by the public, and the influence that has been exerted on the nation's political life. A good deal of data regarding the results of public ownership and private ownership have been given in the preceding pages. The countries whose experience with private management is the most valuable are the United States, England, France, Canada, and Argentina. The countries whose experience with public ownership is the most enlightening are Germany, France, Japan, Belgium, Switzerland, Italy, Australia, Austria-Hungary, and Canada. If we consider broadly the experience of these leading and typical countries we can hardly conclude that it indicates that the public advantages gained from government ownership ordinarily are greater than those derived from private ownership, or that the disadvantages suffered from state ownership are ordinarily less than those suffered from private ownership.

Besides, the evidence shows that the results to the public of government ownership of railways vary widely. There must be causes of the first importance for the differences between the results of state railway management in Prussia and Japan, and in most other countries. The main differences between the conditions in Prussia and Japan, and in other countries, that affect state railway management and its results are those between the temperaments of the peoples, between the forms and characters of the governments, and between the relations of the governments to the peoples, and to railway employes. What these differences are have been pointed out in preceding chapters. The Prussian government is highly undemocratic and the conditions in Japan are still largely feudal. Many other countries that have adopted government ownership are more or less democratic. The suffrage in Prussia is fixed largely on a property basis. In most other countries that have adopted government ownership, the suffrage is much less restricted, and in a large majority manhood suffrage obtains, railway employes, in consequence, constituting a large part of the total number of voters. In Prussia, railway labor is forbidden to belong to unions, and is subject to a discipline hardly less rigorous and exacting than that of the army; and in Japan, the loyalty of all classes of the people to their government and everything connected with it, borders on fanaticism. Most countries that have adopted government ownership, allow their railway employes to belong to unions and do not subject them to a quasi-military discipline and control.

Since, doubtless it is owing to these differences in conditions that

state railway management in Prussia and Japan * is a success, while in most other countries it is much less successful, or a failure, it does not seem illogical to conclude that any other country, in order to attain as high a degree of success in the management of state railways as Prussia and Japan have, must follow the example that Prussia and Japan, and especially the former, have set in organizing and managing their railways. But the example set by Prussia in organizing and managing its railways probably could not be followed without following the example set by Prussia in many other ways; for Prussia could not have organized and managed its railways as it has and does if it had not had the kind of government and people that it has. Now, for the people of countries such as the United States, England, France, Canada, and Australia to follow the political example of Prussia, would be for them to revert to a form of government and to political institutions which they regard as inconsistent with the rights of the individual to great freedom of action, and with the right of the people as a whole to govern themselves.

One may sincerely and ardently believe that democracy is the best form of government to secure to the citizen the inalienable rights to life, liberty, and the pursuit of happiness; one may have confidence that democracy can succeed in so regulating the relations between large business concerns and the public, as well as between individual and individual, as to protect the rights and further the interests of all; and yet be convinced that so far as democratic government has as yet developed in most parts of the world it is not a good form of government for managing commercial enterprises. A government to be successful in the management of large commercial enterprises must, to a very great extent, be organized and administered as successful private business concerns are organized and administered. The fundamental requisites of successful business management cannot be altered by the simple expedient of transferring

*In his admirable review of "Government Ownership of Railways," Mr. Dunn has been unduly indulgent to the claims for those of Prussia and Japan. Between 1886 and 1912 the railways of Germany increased from 23,062 to 37,665 miles or 14,603 miles. Meanwhile, their capital cost rose from \$94,125 per mile to \$116,662 an increase of \$22,537 per mile, making a total of \$848,456,105 added to the German debt, exceeding by over \$128,000,000 the aggregate amount turned into the public treasury for general purposes since the nationalization of the railways. The working profits claimed for German railways are largely mythical. After paying interest on railway capital, now nearly \$4,400,000,000, they do not provide for necessary maintenance, which is made up by fresh government loans. The German passenger rate is about half ours but 42% of the passenger traffic is third class and 49% is fourth class. Relatively to the average wage, passenger fares are about the same, and practically all traffic in the United States is first class. See Prof. Cunningham's article on this point. The German freight rate per ton

concerns from private to public ownership. Whether a business is owned and managed by a corporation, or owned and managed by the public, the owners, in order that it may be run successfully, must choose and retain the managers solely because of their special fitness for their duties. Having done this, the owners must give the managers wide discretion and authority, especially for dealing with the employees. The owners must interfere very little with what the managers do, and ordinarily must try to hold them responsible only for general results. A democratic government may successfully regulate private concerns that are thus organized, officered, and managed; but few democracies have ever shown an effective disposition to have business concerns owned by themselves organized, officered, and managed in this way.

Now, as to the railway situation in the United States specifically: Is it such as to warrant the belief that a complete change of railway policy in this country is desirable? Or, to come more directly to the point,—do the railway conditions and the general political conditions existing here, and the experience of other democratic nations, indicate that the adoption of government ownership of railways here would be, on the whole, beneficial to the public? The answer to this question is suggested by the following summary of some of the more important conclusions which have been indicated by the facts set forth in the preceding chapters:

1. The railways of the United States are, considering all pertinent conditions, as economically managed as any in the world; and it is probable that under government management there would be an increase in the total expense incurred in rendering railway service.

2. Under private ownership, the development of the railways of this country has gone forward at a rate which, until recent years, has not been equaled in any other country. The capacity of the

mile is 70% higher than ours absolutely, or 30% higher on equalized hauls. An average day's wage will carry a ton of freight three times as far in the United States as in Germany.

In Japan, the capital cost under State ownership has risen from \$47,759 per narrow gauge mile in 1908 to \$88,104 in 1912; the average passenger rate is .69 cents or 54 miles for an average day's pay in Japan against 121 miles for an average day's pay in America. The Japanese freight rate is .83 cents per ton mile, exclusive of terminal charges, against 7.27 mills in the United States, including terminal charges. An average day's pay will carry a ton 45 miles in Japan against 350 miles for a day's pay in the United States.

The State railways of Germany and Japan are only a success in comparison with State railways in other foreign countries. They are not comparable with American railways, except in the matter of discipline and to understand what Shakspeare meant by "insolence in office," one has to travel on German railways. In Japan it is different. S. T.

railway trackage and equipment provided in proportion to both area and population is not surpassed in any other country; and while there are sometimes shortages of facilities for handling freight traffic, these are not peculiar to this country. Similar shortages occur on some of the other leading private and state railways of the world.

3. The quality of the freight and passenger service rendered here is, in most respects, equal or superior to the quality of that rendered by railways in other countries under conditions at all comparable.

4. The service in this country is, however, very deficient as compared with that of most other countries in respect of the extremely important element of safety. But the evidence indicates that this is due rather to local conditions than to private management, and that the situation in this regard probably would not be improved under government management.

5. Passenger rates in this country probably are no higher than in most other countries for similar services; but the average rate per passenger per mile is much higher than it is on most state railways; and state railways usually make lower passenger rates than private railways.

6. The freight rates of the railways of this country have been, and are yet, based largely on what the traffic will bear. In other countries under public management, the domestic freight rates are usually based rigidly on distance. The rate-making policy followed in this country is well adapted to promoting the fullest development of industry and commerce, but it has led to many unfair and extremely harmful discriminations. Public regulation has greatly reduced the number of these unfair discriminations, and doubtless can reduce it further; but, in the nature of things, unfair discrimination seems more likely to occur under private management than under state management.

7. The average freight rate per ton mile of the railways of this country is the lowest in the world, excepting, apparently, that of the state railways of Japan;* and, relatively, to the conditions under which they are charged, freight rates here are probably the lowest in the world. Private railways generally tend to make lower freight rates than state railways; and low freight rates are of more benefit to the public than low passenger rates.

8. While in many countries state railways cause financial losses

*Freight receipts in Japan in 1912 were 8.3 mills exclusive of terminal charges against 7.41 in the United States, including terminal charges.

to the public, in the United States the public derives large sums from the railways in the form of taxes. Furthermore, the amount of taxes being collected from them is rapidly increasing.

9. The condition of the labor employed on the railways of this country, relatively, is as good as that of the labor employed on the railways of any other country; and it could not be substantially improved without imposing an additional burden of rates on travelers or shippers, or both, or an additional burden of taxes on the general public. In either case, the greater part of the added burden would fall on the middle and working classes in general.

10. In view of the experience of many other countries with state management of railways, and of the conditions existing in our own country, it would seem that state management here would have a tendency rather to corrupt than to purify politics.

Clearly the preponderance of the evidence does not indicate that, under existing conditions at least, the adoption of government ownership in the United States would be beneficial to the public.

It would seem, then, that with respect to the railways, there are only two courses which the people of the United States possibly can wisely consider adopting. If they feel now, or shall feel later, that they should ultimately acquire the railways and operate them as a government function, the wise course to take would be to begin immediately to make changes in the form, personnel, and administration of their government which would fit it to assume the burden of railway management. They should cease to condone the course of many members of Congress in voting on numerous important measures with a view chiefly to promoting local, sectional, or class interests, or to complying with local, sectional, or class demands, and insist that their representatives shall habitually put national above all other interests. They should compel a wider application and stricter enforcement of civil service rules. They should compel adoption of and adherence to, the principle of selecting, retaining, promoting, and retiring the administrative officers of the government, except the President and members of his cabinet, without regard to political considerations, and solely with regard to their character, ability, and special fitness for their posts. The public should require comprehensive changes in the organization and administration of the Post Office Department which would put the rates it charges, the service it renders, the personnel of its officers and employes, and the results sought and gained by it, on a business basis. The government is a large corporation; the people are its stockholders; and if this great

corporation is ultimately to take over the ownership and management of any business as large as that of the railways, it is vitally desirable that before it does so its stockholders and officers shall have adopted and become thoroughly habituated to acting on sound business principles. If government ownership and management of railways are adopted before the people and public officials of this country have learned to regard the government as a concern for efficiently transacting the public business in the interests of the entire nation, then government management of railways here will be a terrible failure.

The second of the only two courses which the people of the United States can with any wisdom consider adopting, is that of leaving the ownership and management of the railways in private hands, and at the same time developing and perfecting the present system of public regulation.* The danger confronting the country under private management and public regulation is twofold. On the one hand, there is the danger that if the pressure of the regulating authorities and public opinion shall be relaxed, some railway managements may revive the old abuses. On the other hand, there is the danger that regulation may become so comprehensive and restrictive as to limit unduly the exercise of discretion, initiative, and enterprise by the railway managers and to reduce and keep the profits of railways below the point where investment in them will be sufficiently attractive. But in view of the improvements which have been made within recent years, both in the management and in the regulation of railways in this country, it would seem that it should not be impracticable to develop a railway public policy by which both of these dangers would be avoided.

Certainly the risks that the American public would take by proceeding vigorously, but patiently and fairly, with the development of the policy of regulation that it has now entered upon, would be much less than those it would incur by adopting government ownership. The former course would be evolutionary, the latter revolutionary; and the readjustments incidental to evolution usually are much less extensive, violent, and painful than those made necessary by revolution; while the results flowing from it usually are much more satisfactory and beneficent.

*For a fuller discussion of government regulation see the author's book, "The American Transportation Question," and especially Chapters XI and XII.

THE BELGIAN RAILWAYS*

BY M. A. PIERRARD

Director of the Belgian Marine Administration.

No country in the world surpasses Belgium in comparative density of railway mileage. While France has 9 km. of line to every 100 sq. km. of territory, Germany 11 km., and Great Britain 12 km., Belgium has no less than 28 km. of railway to every 100 sq. km.

At the very beginning of Belgian railway construction the question of ownership and control was debated, and the issue was obscured by contemporary political problems. The so-called "Patriotic Party," in the thirties of last century, feared that private ownership would place in the hands of the great capitalists the monopoly of transportation in the direction of Antwerp and Ostend, which would have placed the Belgian ports at the mercy of the Netherlands Government. Hence it was decided that the first railways should be built at the national expense, and that their operation, for the time being at least, should be entrusted to the State. The Law of May 1, 1834, thus decreed the construction of a network radiating from Malines, with an eastern line to the Prussian frontier, via Louvain, Liège and Verriers; a northern line to Antwerp; a western line to Ostend, via Ghent and Bruges; and a southern line to the French frontier, traversing Brussels en route. The first section, from Malines to Brussels, a distance of 20 km., was opened for traffic in May 5, 1835, and by 1843, when the programme was finished by the inauguration of the line to the Prussian frontier, the State system already comprised 556 km. (345 miles) of line.

But, while adhering in principle to the operation of railways by the State, the Belgian Parliament had no intention of giving an absolute monopoly, and, simultaneously with the establishment of the State system, concessions were granted to private companies, notably for railways in the mining districts. Some 80 concessions were awarded between 1840 and 1860 to private undertakings, many of which speedily amalgamated with each other. Nearly all these private lines have since been taken over by the State, for political or economic reasons, and to-day the lines under private ownership

* Abstract of a paper before the Sixth International Commercial Expansion Conference from the *Railway Gazette*.

have a total length of no more than 350 km. (211 m.), as against the 4,300 km. (2664 m.) of the State railways.

Originally four passenger classes were maintained on the Belgian railways, known as *berlines*, diligences, *chars-à-banc* and wagons. Since 1899 only second and third have been provided, although more recently the first-class has been revived on certain services under the style of *wagons-salons*, or "reserved" compartments, according to circumstances. The present percentage of passengers is: "reserved," .95 per cent; second, 11.05 per cent; third, 88 per cent. The best year on record for passenger traffic was 1910, when the Brussels Exhibition was held, the passengers aggregating 175,312-540, and the receipts amounting to \$19,965,087. This gave an average figure of 40,496 passengers and \$7,432 per mile. A peculiar thing about the passenger traffic is that the length of the average journey has hardly varied during the past 40 years, being round about 13.6 miles, although in 1910 it rose to 15.4 miles. Another peculiarity is the enormous volume of business conducted on the workmen's season-ticket system, amounting to more than 69 per cent of the total number of passenger movements. These tickets are valid for six double journeys within one week, and their price is based on a zone system, the rate varying from 24 cents for 6.2 miles to 44 cents for 31 miles, which is possibly the cheapest form of railway travel in the world. Besides these workmen's tickets there are many other forms of tickets at reduced rates — scholars', children's, two-day return tickets at a reduction of 20 per cent, &c. — so that actually nine-tenths of the total number of passenger journeys are made at fares lower than the "normal" tariff, which accounts for the low per mile receipts of a fraction over 7.1 mills per passenger.

There are three principal goods tariffs — express, "accelerated," and slow (*petite vitesse*). The first two are only available for consignments whose weight does not exceed 150 and 200 kg., respectively. Until the end of 1912, merchandise not exceeding 60 kg. in weight could be sent under either of these tariffs at a charge based only on weight and entirely irrespective of distance. This peculiarity has, however, been done away with. Taken as a whole, the Belgian goods tariffs are based on a scale of charges diminishing with the distance. Besides the three principal tariffs, there is a fourth for bulky merchandise of small value, but to obtain advantage of this rate the minimum consignment must weigh 10,000 kg. (about 5 tons). The State lines own some 85,000 goods vehicles, exclusive of about 1,500 private wagons, and the average daily number of

freight trains is 2,400, with a mean journey of 26.7 miles per train. The yearly goods traffic amounts roughly to 58,000,000 tons, from which the gross receipts are approximately \$34,161,000. The total number of locomotives, passenger and goods, is about 4,200.

Competition between the Belgian railways and the canals and other inland waterways is a point of more than academic interest. The majority of the navigable waterways existed prior to railway construction, and since then the State has spent money on their improvement with the idea of not wasting a national asset. Rates for water transport are, on the whole, lower than those by rail, since the charges are only based on the cost of upkeep and maintenance, and there has even been an agitation in favor of the abolition of all charges. The exact extent to which the two forms of transportation compete with each other seems to depend entirely on the circumstances governing the rates for any given kind of traffic. For instance, while the average rate per ton per mile on the State railways is 1.18 cents, the rate on some commodities is as low as .31 cents per ton-mile, while on the waterways it varies from .87 cents .4 cents, to which must be added the tolls, ranging from .24 to .05 cent. The average rate for water-borne merchandise, so far as can be ascertained, is .59 cent per ton-mile. Hence competition may be active in some instances and negligible in others.

THE PRUSSIAN-HESSIAN STATE RAILWAYS

BY W. J. CUNNINGHAM

Assistant Professor of Transportation, Harvard University.*

Altogether, there are about 34,500 miles of state-owned railways and 2,200 miles of private-owned railways, in Germany. Of the state-owned mileage, Prussia has 23,335, or slightly more than two-thirds. Bavaria comes next with 14.1 per cent. Then comes Saxony with 5.1 per cent; then respectively, Alsace-Lorraine with 3.6 per cent; Baden with 3.1 per cent; Mecklenburg with 2.0 per cent; and Oldenburg with 1.2 per cent. In Prussia-Hesse, the private-owned mileage is 6 per cent of the total. The private railways, however, are comparatively unimportant and are controlled by the government almost as completely as the railways of the states. They are obliged not only to conform to the state traffic regulations but as well to adopt the rules and standards set by the government for the same class of state-owned railways.

STATE OWNERSHIP.

If we may accept as true the statements of the early advocates of state ownership for all of the railways, the greed, selfishness, and arbitrariness of the private railway companies were the causes which led to their ultimate absorption by the states. The results, however, were not unprofitable to the shareholders. Widespread complaints crystalized into a common demand for government ownership, and the movement had a peerless leader in Bismarck. The causes of dissatisfaction, then, remind us of those now advanced so hysterically by those in New England who wish to bring about state ownership of the Boston & Maine.

In order to summarize the reasons which impelled Germany to give up private ownership, we can hardly do better than to quote from Bismarck's speeches in Parliament. He protested that the railways must not be allowed to act the part of Providence and alter the natural laws of supply and demand; they must not be allowed to dominate trade and industry; they must not be allowed to grant pref-

* Abstract of a paper presented before the New York Railroad Club, April 18, 1913.

erential treatment and discriminate in favor of the large shipper at the expense of the small trader; they must not be allowed to overcharge on non-competitive traffic in order to recoup themselves for losses on competitive business; they must not be allowed to grant passes and rebates to the favored few. In brief, the arbitrariness, the egotism, and the discrimination of individuals, must be checked. Instead, a policy must be substituted which, under state ownership, should bring about uniformity of charges, equality of service, protection of public interests, and the establishment of a just, diligent, and able railway administration actuated solely by considerations of the general good of the country.

Many reasons, other than those quoted from Bismarck's speeches, are given as the real object of government ownership. It is commonly believed that military reasons were dominant, that the government in its consistent policy of preparedness for war desired absolute control of all transportation facilities. Taking the view of economists of high standing in Germany, it appears that the real and controlling reason was economic. The object was not to make the railways a means of state power, nor of revenue, but to make them a means of traffic subservient to the economic interests of the nation; to substitute the state for private enterprise as the guardian of the commercial interests of the community.

RATE POLICIES.

It is proper to add that when the nationalization project was before Parliament, Bismarck promised substantial reductions in rates. These promises, no doubt, were made in good faith, but subsequent political exigencies have caused their repudiation. The railways of Prussia, as now administered, make large profits, and they apparently could afford to place freight rates on a lower basis and still continue to take care of renewals and betterments. They continue to earn a large surplus and every year they turn over a substantial part of it to the state to be used for the general budget. In the year 1910, the net earnings in Prussia were 6.48 per cent on the capital investment of \$114,000 per mile of line (nearly double our average capitalization) and out of \$170,000,000 net revenue, \$50,000,000 was devoted to other than railway purposes. The patrons of the railways, therefore, particularly the freight shippers, have reason to complain that they are taxed for the benefit of the community at large.*

* See note to Mr. Dunn's article on "Government Ownership."

ORGANIZATION.

At the head of the railway administration of Prussia, is the minister of public works, who is appointed by, and may be removed, only by the king. Changes in this office are very infrequent. The minister and his councillors correspond roughly to our board of directors or executive committee and chairman; but the several councillors are railway experts, and each devotes his attention to the department in which he has specialized.

The ministry deals only with general matters of policy and standards. The active administration is left to the local directorates, of which there are 21. The average mileage per directorate is 1,116. At the head of each directorate is a president, who reports to the minister of public works. The president of a directorate corresponds in a general way to our general manager, but he has control over every department on his division, including not only maintenance and operation, but also traffic, accounting, finance, and construction. It will be seen, therefore, that the Prussian operating unit — the directorate — is the highest type of the divisional system of organization. Below the president the organization becomes departmental, and the lines of authority and responsibility are tightly drawn.

While the principle of local autonomy in the operating of each directorate is carefully guarded, it has been found advantageous to concentrate a few functions exclusively in one of the several directorates, the one so selected to act in that particular matter for all other directorates. Besides, there is a central office in Berlin, which is rated as a directorate (making 22 in all) and attends to certain specified activities for the system as a whole. In some respects the president of the central office resembles our superintendent of transportation, but the former has wider jurisdiction, including that of our purchasing agent.

Associated with the administration are two kinds of advisory or consulting bodies: (1) advisory councils, local and central, established by law; and (2) voluntary traffic and operating unions. The advisory councils are composed of representatives of the government, and delegates from boards of trade, industry, and agriculture, as well as representatives of the railway administration. The administration is obliged to consult with these advisory councils on all matters affecting rates or public service. They have no actual power to compel the railway administration to accept their recommendations, but, like the findings of the Massachusetts Railroad Commission, their recommendations are equivalent to commands. The jealousies

of sections usually prevent any tinkering with tariffs, even when the administration might be willing to make a reduction which would benefit certain communities. To illustrate, the German policy would not permit California to compete on equal terms with Florida for the New York fruit market. Florida's natural advantage in being nearer the New York market would be guarded.

The advisory councils, on the whole, are to be commended, both in their negative and positive results. Through them the industrial, agricultural, and trade bodies are the arbiters of their own interests in transportation, and all persons affected by railway rates and rules of service have an opportunity to be heard before any change can be made in existing tariffs or regulations.

The American railroad man who visits behind the scenes on the Prussian railways is struck by the absolute impersonality of the organization. Authority flows from the office, and respect is accorded to the office, rather than to the man who happens to fill it. The personality of an official, which is so important here, has practically no play under the Prussian organization. Letters or instructions emanate from the directorate, and may bear the signature of any one of the officials, but in the name of the directorate.

DISCIPLINE.

It is well known that practically all of the railway employes of Prussia have served in the army. When they enter the railway ranks from the army, certain credits are allowed for their military service, and certain positions are reserved for army men. This military experience shows its influence on their deportment and discipline in railway service. There is a noticeable orderliness and precision about everything connected with German railways. In respect for authority and strict observance of the rules, the German railway employee has no superior. The traveler will not fail to notice the red-capped station master standing at attention on the station platform as the train passes through each station. He will also find the senior signalman, gatemen, and other employees connected with train service always in evidence, standing like sentries as the train passes. The operating official, while riding over the line, can thus take a census of all employes in positions of responsibility. When he alights at a station his rank is at once recognized. The station master immediately salutes and gives a verbal report of the situation at his station. If the official goes into a signal tower, the signalman in charge salutes and reports. If he goes into an engine

house, the foreman salutes and gives a brief report of the work in progress.

The formation of railway labor unions in Prussia is forbidden by the railway administration. The employes have associations, but inasmuch as the railway officers are ex officio members, and take a fairly active part in the proceedings, these associations bear little resemblance to our railway brotherhoods.

The high order of discipline and rigid observance of rules, which follows their system of ample and constant supervision, bears fruit in their remarkable immunity from train accident, and in the small number of passengers and employes killed or injured. Differences in the manner of compiling accident statistics make comparisons with this country difficult. It is possible, however, to make a comparison of injuries in train collisions and derailments, since the classification is the same in both countries and the statistics are made up on the same basis. In 1910, only 2 passengers lost their lives in collisions and derailments on Prussian railways.* In that year they handled 1,083,882,279 passengers. In the same year the United States, with ten times the railway mileage, transported 971,683,199 passengers (112 million less than Prussia). But it must be borne in mind that our passengers traveled farther. In Prussia the average passenger journey is 14 miles; here it is 33 miles. Consequently our railways produced more passenger miles, although they handled a smaller number of passengers. Looking at it one way, it is fair to the United States to compare injuries to passengers on a basis of passenger miles. Viewing it from another angle, it may be said that collisions and derailments will tend to vary with the train miles rather than with the number of passengers. We will make the comparison on the two bases:

PASSENGERS AND EMPLOYES KILLED AND INJURED IN COLLISIONS
AND DERAILMENTS, 1910.

Item.	Prussia-Hesse.	United States.
Passengers carried one mile (millions).....	15,688	32,338
Total revenue and non-revenue train miles (thousands).....	298,584	1,276,025
Passengers killed in collisions and derailments.....	2	127
Passengers injured in collisions and derailments.....	349	6,499
Employes killed in collisions and derailments.....	13	608
Employes injured in collisions and derailments.....	162	5,201
Passenger miles per passenger killed (millions).....	7,844	255
Passenger miles per passenger injured (millions).....	45	5
Total train miles per passenger killed (thousands).....	149,292	10,048
Total train miles per passenger injured (thousands).....	856	196
Total train miles per employee killed (thousands).....	22,968	2,099
Total train miles per employee injured (thousands).....	1,813	245

* * The year 1910 was one of exceptional immunity from fatalities in train

Attention is again drawn to the fact that the foregoing tabulation includes only the injuries in collisions and derailments. Injuries in other train accidents, falling from moving cars, highway crossing collisions, trespassing fatalities, suicides, etc., are not included in the figures for either country. Those for this country are sufficiently familiar to us. The small number of accidents to trespassers (killed 180; injured 145) is noticeable. In Prussia the laws prohibiting trespassing are strictly enforced and the railway right of way is carefully guarded. Those who trespass assume a high risk of arrest since the tracks are well patrolled. All persons detected are arrested, fined, or imprisoned. A passenger who is caught in the attempt to cross the tracks even in their station limits is promptly taken before the authorities. Our lawmakers and judges might well take note of this firm attitude of the Prussian courts with its gratifying results. The fact that 14 trespassers are killed daily on the railways of the United States, although given wide publicity, has thus far made little impression on our city and county authorities. In Prussia, one trespasser was killed every second day.

The poor accident showing in this country is largely due to the inherent tendency of the American railroad man to take chances. In Prussia, the railway employe is more deliberate in action, and his military training gives him greater respect for the rules. It may be, too, that the methods there employed to investigate accidents and mete out punishment to the careless, have a direct bearing on their remarkable immunity from casualty. Discipline for infraction of the rules is severe. Guilty employes are not only reprimanded, suspended, fined, or dismissed, but in flagrant cases they are imprisoned. In 1910, there were 132 cases of criminal prosecution, and 81 employes were given court sentences.

COMPENSATION OF EMPLOYEES.

Turning now to the question of salaries and wages, it is interesting to note that in 1910 the average yearly wages of the Prussian railway forces, including all officials as well as workmen, was only \$380 per employe. The official statistics show that the average number of "rest days" per month was 3.44 for all employes whose duties require any Sunday work. This gives an average of 324 working days, and an average daily compensation of \$1.17. The writer has

accidents on Prussian-Hessian State railways. Whereas, in 1909, no less than 25 passengers on the same roads lost their lives in accidents to trains. Prof. Cunningham fails to take account of the predominating influence of freight traffic in casualties on American railways. S. T.

not sufficient information to hazard a guess as to how much more should be added to that average to allow for the supplementary allowances. He believes, however, that **it is within the bounds of reasonable accuracy to say that the gross income of the Prussian employe is just about one-half the average wages of the American railway man.** The general average for this country in 1910 is given by the Interstate Commerce Commission as \$2.14 per day,* excluding officials, but the accuracy of the figure is open to question because of differences in methods employed by different railways in compiling the basic figures. It must be remembered, however, in making comparisons between the two countries, that the cost of living is considerably lower in Prussia, and the purchasing power of the dollar is correspondingly greater.

An examination of the list of salaries, etc., shows that the financial reward for the officials is striking in its moderation. The presidents of the various directorates receive but \$2,900 per year and a free dwelling. The honor and prestige which go with the position are rated high and evidently compensate for the lack of salary. His assistants, in addition to free dwellings, are paid \$1,000 for the first three years, and a small amount is added every three years until they reach the maximum of \$1,720, after 18 years of service.

On a road mileage basis Prussia has 21 employes per mile. The average in group 2 of this country is 16 per mile, and in the whole United States 7 per mile.

PHYSICAL CHARACTERISTICS.

Turning now to a consideration of the physical characteristics of the Prussian railway system as it is to-day, we will first examine its trackage facilities. Serving as it does such a thickly populated district (about 300 per square miles), and having such dense traffic (as will be apparent from the figures to be presented later), we naturally expect to find the lines well equipped with multiple running tracks. Nearly one-half of the system has two or more tracks. In group 2 of the United States (comprising the railways of New York, New Jersey, Pennsylvania, Maryland and Delaware), the territory in this country which comes nearest to resembling Prussia in population and railway development, the percentage of two or more running tracks is practically the same as in Prussia, but in the United States, as a whole, only 10.5 per cent of the railways have two or more tracks. The comparative figures which follow may be of interest:

* The average pay in 1910 was \$2.29 per day and in 1913 it was \$2.49. S. T.

TRACK DENSITY IN PRUSSIA-HESSE AND UNITED STATES, 1910.

Trackage	Prussia-Hesse.		Group 2: U. S. A.		United States.	
	Track miles.	Per Cent of road miles.	Track miles.	Per Cent of road miles.	Track miles.	Per Cent of road miles.
Single track.....	23,364	100.0	23,815	100.0	240,831	100.0
Second track.....	9,807	42.1	7,609	32.0	21,659	9.0
Third track.....	44	0.2	1,284	5.4	2,206	0.9
4 or more tracks.....	119	0.5	941	4.0	1,489	0.6
Yards and sidings.....	15,287	65.4	16,101	67.6	85,582	35.5
Total Trackage.....	48,621	208.2	49,750	209.0	351,767	146.0

The Prussian roadbed, particularly on the main lines, is well built and well maintained. Steel rail, of design similar to ours, and weighing 91 lbs. per yard is now standard, but the greater part of the mileage still has the lighter rail, averaging between 70 and 75 lbs. per yard. Crushed stone and gravel predominate as ballast, the former being generally used on the important lines. Their standard roadway section for single track main lines calls for a width of 19 ft. across the top of the subgrade, 9 in. of ballast, and 13 ft. across the top of the ballast. Multiple tracks are spaced 11½ ft. on centers. Tie plates are used on all lines of heavy traffic and screw spikes are standard everywhere. About 31 per cent of the mileage is laid with metal ties of the inverted trough type, and practically all wood ties are creosoted. The average spacing of ties is 28 in. from center to center, and their length runs from 9 ft. on main lines to 7½ and 8 ft on branch lines. The use of the metal tie has not become a settled policy, and there is much discussion in Germany as to whether it is really superior to the treated wood tie, when all factors are considered.

Station, siding, and yard facilities at many points, particularly near the frontiers, seem entirely too generous for the regular freight and passenger traffic. The explanation lies in the possible need of these facilities for the handling of troops and military supplies. All freight cars are stenciled to show capacity not only for freight but also for men and horses. A time-table for military operation is ready for use on short notice, and in the event of war, the trains for troops, horses, guns, and supplies would take precedence over all other traffic.

PASSENGER STATIONS.

The passenger stations in the cities, particularly the stations built within the last 15 years, are imposing in design, generous in size and trackage facilities, and well equipped to take care of the

needs and comfort of the maximum traffic. The Hamburg main station is a good example. Those at Cologne, Frankfort, Darmstadt, and Halle, are notable. The latest and most magnificent, as well as the largest station in Europe, has just been completed in Leipsic at a total cost of upwards of \$40,000,000. It has 22 tracks under one train shed. In Berlin, there are several large stations to serve the different lines radiating therefrom, but there is no central or union station. All the Berlin passenger stations are connected by the north and south rings — belt lines which carry an enormous passenger traffic. Conditions on these belt lines, which intersect both the business and residential sections, seem ideal for electric operation, but the service is still steam operated, although electrification has been under consideration for several years.

In the freight classification yards we find occasional use of the "hump" in switching. A good example is seen at Wustermark, near Berlin. There are separate humps for each direction, and besides the well-laid out yards, there is an admirably designed freight transfer station of concrete construction. The light cars are very easily handled over the hump. The writer observed a 48 car train classified in 12 minutes, each cut averaging about two cars.

The frequency of fixed signals and signal cabins is noticeable. All are of the manual or manual control type. The Germans do not take kindly to automatic signals. They prefer to rely upon the signalman. When asked why they do not consider the adoption of the automatic signal, which has been developed here to such a high degree of perfection, they usually turn the conversation to train accidents and inquire why it is that America has such an unenviable record in that respect.

The official statistics show that Prussia has 40,916 home signals (1.7 per mile of line) and nearly 15,000 distant signals. There is one interlocking cabin for every $5\frac{3}{4}$ miles. Grouping together all signal towers, cabins, and block stations, there is one for every one-half mile of line. On 2,800 miles of line where speed restrictions apply, automatic speed recording devices are installed alongside the track, and the records are carefully checked to insure strict adherence to the rules.

LOCOMOTIVES.

The Prussian passenger locomotive on through trains is considerably lighter than ours, but there is not as much difference as is generally supposed. In that class of service the Atlantic and 10-wheel type predominate. A large proportion of all locomotives is

of the compound type. Germany is the home of the superheater and nearly all engines are equipped with the device, as well as feedwater heaters, draft regulators, screw reversing gear, and other appliances which are not common here. The interior of the cab, especially in those equipped also with cab signals, seems somewhat complicated to the American observer.

The tank locomotive, which is comparatively light, appears to be the favorite in local passenger service. Freight locomotives vary in size, but most of them are little more than half the size of our freight locomotive. With the small freight cars and light grades of the main lines, the length rather than the weight of the train is the controlling feature, and heavy engines are not needed. In southern Germany, however, where the grades are heavier, there are many locomotives which in weight and power compare favorably with those of the American consolidation type.

In 1910, Prussia had 19,670 locomotives of all kinds. This is an average of 84 locomotives per 100 miles of line. The average for the United States in the same year was 25, but in group 2 it was 57. The average weight of all Prussian locomotives, including tender, was 59 tons. For the United States, the average weight was 73 tons, exclusive of tender. Without knowledge of the weight of the tender, and the proportion of tank locomotives in each country, it is impossible to make an exact comparison, but in the judgment of the writer, it is close to the mark to say that the Prussian passenger locomotive is about two-thirds the size of the American passenger locomotive, and the Prussian freight locomotive about one-half the size of ours.

The cost of maintaining locomotives in Prussia in 1910 averaged 4.8 cents per mile, which indicates commendable efficiency even when due allowance is made for their small size. Failures are infrequent, and the locomotives generally have the appearance of being well maintained. The Prussian policy differs from ours in that they expect and obtain a comparatively long life from their locomotives. The average life of all locomotives in 1910 was 10.2 years. One was 40 years old; 10 were 37 years old; 9 were 35 years old; 10 were 33 years old. One-quarter of the entire equipment ranged from 10 to 20 years in service; 45 per cent ran from 5 to 10 years; and 22 per cent had an average age of less than 5 years. The average mileage per locomotive in 1910 was 25,600. The same average for this country was approximately 29,100.

The Prussian statistics showing the performance of locomotives (and in fact all of their statistics) are remarkably complete. Among

other things they give the number of days all locomotives were in service, the per cent of time in actual use, and the per cent of time they were in the shops for repairs. They were actually used in train service 32.79 per cent of their time; 18.91 per cent of their time was spent in the shops for repairs; leaving 48.3 per cent of the time when they were idle, in or near the engine house. The high proportion of time idle is accounted for by their policy of single-crewing. When not single-crewed, it is the general practice to assign one engine to two crews. Enginemen are required to do much of the light running repairs themselves, and on single-crewed engines the fireman is required to report at the engine house two hours in advance of leaving time, in which to kindle the fire and get up steam. At the end of the trip it is his duty to clean the fire and do other work, which here is done by the engine house forces.

Careful attention is paid to fuel economy, and premiums are paid to engine crews for economic results. The writer did not personally secure any detailed statistics on this feature of operation, but the figures given recently in the *Railway Age Gazette* (January 3, 1913) by H. W. Jacobs, throw light on the subject. Mr. Jacobs compares the performance on a division in Prussia with a division of an American railway with somewhat similar service.

PASSENGER CARS.

The passenger cars of Prussia conform to the usual European design of separate compartments. The older type, used exclusively in suburban and local service, has doors on each side of each compartment, and when the train is in motion the only means of communication between cars or between compartments of different classes is by the running board on the outside of the car. This, of course, is used only by the trainmen, and by them, rarely.

Altogether, there are 51,703 passenger, baggage, and mail cars in Prussia, or 222 per 100 miles of line. In group 2 of the United States the passenger train car density is 52; in the United States, as a whole, 20. Of the Prussian equipment 68 per cent have side entrances and 32 per cent have end doors and vestibules. The latter are used almost exclusively in through trains. More than half of the passenger cars have 3 axles, one under each end of the car and one under the center; 33 per cent have but two axles; and the remaining 13 per cent are of the modern type for the best trains, and have four or six axles. Averaging all passenger train cars, the number of axles per car is 2.72. The older type of two or three axle car with side

doors is very small and weighs about 20 tons. The modern corridor car, with four or six axles, is 60 ft. long, 9½ ft. wide, and weighs from 45 to 55 tons. The capacity of the car depends upon the classification of the compartments. There are four classes. First-class compartments seat four passengers (two per seat); second-class, six passengers; third-class, eight passengers. Fourth-class compartments are much larger, but only a limited number of seats are provided for the first comers — the other passengers stand. **As a rule, those who stand in fourth-class compartments far outnumber the fortunate few with seats.**

First-class compartments correspond with our parlor cars; second-class cars are as comfortable as our best modern coaches; third-class accommodations are considerably worse than our poorest and oldest day coach, or perhaps a shade better than our colonist car. **The seats in third-class cars are not upholstered.** With four passengers per seat all occupants are crowded. We have nothing that compares with fourth-class. Very few passengers use first-class compartments. Most of the well-to-do and tourists travel second-class. A traveler who wishes to economize may ride third-class for short distances without much discomfort, if the train is not crowded, but he must be in hard straits indeed to economize by riding in fourth-class cars. Nevertheless, as will be pointed out later, 46 out of every 100 passengers use fourth-class accommodations. About 86% of passenger cars are fitted with air brakes.

FREIGHT CARS.

The average capacity of all Prussian freight cars in 1910 was 15.7 tons. Practically all of them have but two axles. Only one-third are fitted with brakes of any kind and only a very few of these with air brakes. Automatic couplers have not been adopted, although used experimentally. The standard box car of Prussia is 26 ft. long and has a capacity of 16.6 tons. Coal cars run in capacity from 22 to 40 tons, but those of the higher capacity are relatively few. The dead weight of the standard box car is 10.7 tons, or 65 per cent of its capacity.

It is not to be assumed that Prussia is to be charged with shutting its eyes to the apparent economies in the use of the large-capacity car. As a matter of fact, the peculiar conditions of the traffic there (as in England) seriously minimize the advantageous use of cars of the American type. The distinctively retail character of the freight shipments makes it difficult under present conditions for shippers to

avail themselves of the special rates applying to the carload minima of 5 and 10 tons, and they are obliged to enlist the services of *spéditeurs* (forwarding agents) who undertake to consolidate the freight of various shippers so as to obtain the carload rates. Small lot shipments predominate, and the immense quantities of bulk freight offered to the railroads of this country are not seen in Prussia. Much of the low-grade freight moves there by river or canal.

Another factor which influences freight car design, and which affords an example of the penalties of standardization, is the axle load limit, which is set at 31,000 lbs. Prussia is party to the rolling stock agreement between the several European nations which use the freight cars of all subscribers in common, much as the railways of the United States make common use of their freight cars. The design of cars for such joint use must necessarily conform to the clearances and track limitations of the weakest link in the chain. Italy happens to be that link, and sets the maximum axle load for the other systems which are parties to the agreement. **The maximum axle load in the United States is approximately double that of the European railways.** This feature, however, does not prevent the use of heavier equipment when confined exclusively to the Prussian rails. They are adding to their heavier equipment each year and are experimenting with cars of the American type. For transporting machinery and heavy guns from the Krupp works at Essen, flat cars of very high capacity are utilized. The largest has 16 axles and has a capacity of 85 tons.

The total number of freight cars of all kinds in Prussia in 1910 was 415,797, or 1,782 per 100 miles of line. The freight car density of group 2 in the same year was 2,168; and for the entire United States, 887. The number of cars, however, is not the true index. Their capacity must be considered. Expressed in terms of capacity per 100 miles of line, Prussia had 28,000; group 2 had 78,048; and the United States had 31,932.

TRAIN SERVICE.

In speed of passenger trains Prussia is somewhat behind England and France. The fastest train in Prussia makes the run of 178 miles between Berlin and Hamburg at an average speed of 55.2 miles per hour. The next fastest train is between Berlin and Halle, 100 miles, at a speed of 54.9 m. p. h. There are several other through trains which average over 50 m. p. h., and the average schedule speed of all through trains is given in the official statistics as 40 m. p. h. With the exception of a few of our limited trains, and the Camden-

Atlantic City trains, the Prussian speeds are equal to those of this country. There are several trains, for instance, which for similar distances and a similar number of stops, make somewhat better time than the 5-hour limited trains between New York and Boston. The Prussian trains, too, are almost invariably on time.

We will now undertake a consideration of the traffic characteristics and first examine the statistics of train mileage, and passengers and tonnage handled. As already stated, the number of passengers handled in Prussia exceeds the total number handled in the United States. We are therefore prepared to find a very dense passenger train mileage per mile of road. Freight traffic is also dense in the industrial regions of western Prussia, but when averaged for all of Prussia the figures are not so impressive. A comparison of traffic and train mile density is shown in the following table:

PASSENGER MILES, TON MILES, TRAIN MILES AND OPERATING
REVENUE PER MILE OF LINE, 1910

Item—	Prussia-Hesse.	Group 2.	United States.
Passenger miles per mile of line.....	693,921	314,187	138,169
Ton miles per mile of line.....	1,150,490	2,797,011	1,071,086
Operating revenue per mile of line.....	\$22,144	\$24,619	\$11,553
Passenger train miles per mile of line.....	7,741	*5,515	*2,787
Freight train miles per mile of line.....	4,824	*4,832	*2,286
Total revenue train miles per mile of line.....	12,565	10,347	5,073
Average passengers per train mile.....	87	63	56
Average revenue tons per train mile.....	236	502	380

*Special train miles included in passenger; mixed train miles in freight.

The significant facts in the above comparison are that in revenue passenger mile density the United States as a whole has only 21 per cent of the Prussian density. Group 2, which has the greatest passenger traffic of any group in the United States, has 45 per cent of the Prussian passenger density. In ton mile density, however, the United States is almost as much as Prussia, and group 2 exceeds Prussia in that respect by 140 per cent. The Prussian passenger trainload is considerably heavier than ours, but the majority of the passengers ride in the third and fourth-class cars, already described. In freight-trainload, however, Prussia is conspicuously low. Its average is less than half the trainload of group 2, and about two-thirds that of the whole United States.

PASSENGER TRAFFIC AND RATES.

The German statistics of traffic are available in great detail, and we are able to analyze the receipts and averages for each class of

passenger and freight. To show the results for the passenger service, the following summary is inserted:

DIVISION OF PASSENGER TRAFFIC PRUSSIA-HESSE, 1910.

Class—	Per cent of passengers carried	Per cent of passenger miles	Per cent of passenger revenue	Average revenue per passenger	Average revenue per pas- senger mile	Average miles per passenger
First class.....	.14	.89	2.94	\$2.65	2.89c	92
Second class.....	9.66	11.00	18.56	.25	1.49	16
Third class.....	43.66	39.51	41.65	.12	.93	13
Fourth class.....	45.51	44.59	35.09	.10	.69	14
Military.....	1.03	4.01	1.76	.22	.39	56
Total.....	100.0	100.0	100.0	.13	.88	14
Tickets sold at reduced rates —season tickets, work- men's, school tickets, etc. (included in above)....	55.46	26.75	14.53	.03	.38	7

The preponderance of the third and fourth-class traffic, and the exceedingly small number of first-class passengers, are noticeable. The astonishingly low average passenger mile rate (8.8 mills) loses much of its value for purposes of comparison with this country because it includes such a relatively large number of passengers who travel in the inferior class compartments. The returns include also the traffic on passenger belt lines in Berlin and the electric railway between Hamburg and Altona. Both of these lines carry a heavy traffic, which is essentially the same as is handled by the subways and elevated railways of New York, Chicago or Boston.

In second-class compartments, which come nearest to our day coaches, the Prussian average revenue was 1.49 cents per mile. Our average in the same year for all passenger traffic was 1.938 cent. The Prussian first-class corresponds to our parlor cars. Their average receipts for that class were 2.89 cents per mile, which is substantially above our average, even when the Pullman car fare is added. For instance, the regular fare from New York to Boston is \$4.75. Add \$1.00 for parlor car seat and we have an average rate of 2.47 cents per mile.

In passing, attention should be called to the fact that there is no free baggage allowance in Germany. Passengers may take a generous amount of hand baggage with them in the compartments, but trunks and other similar baggage must be registered and transported in the baggage car. The baggage tariff is on the zone principle. For example, the charge for the first zone (1 to 15.5 miles) runs from 5

cents for 44 lbs., to 14 cents for 165 lbs. For the fourth zone (95 to 124 miles) the charges are 12 cents and 71 cents respectively. For the sixth zone (158 to 186 miles) the charges are 12 cents and \$1.07. To illustrate further, by again using the New York and Boston journey, the additional cost of a trunk weighing 150 lbs. would, under the Prussian tariff, be \$1.43, which is equivalent to adding 0.61 cent per mile to the price of the ticket.

The Prussian statistics show, however, that relatively few passengers carry other than hand baggage. Altogether in 1910, the railways transported 820,000 tons of baggage. This is an average of $1\frac{1}{2}$ lbs. per passenger. The revenue from baggage was \$4,370,000, or 27 cents per 100 lbs. The average distance carried was 65 miles. Each 100 lbs. of baggage, therefore, cost the traveler 41 cents for each 100 miles transported. Baggage charges made up 3 per cent of the total passenger revenue.

Before leaving the passenger service, mention should be made of the practice of selling "*bahnsteig*" (platform) tickets which permit the friends of incoming and outgoing passengers to meet or part with them on the station platform at the car door. These tickets, which cost 10 pfennig (2.4 cents) are procured through slot machines. They are punched by the gateman when the holders pass through the gate to the platform, and are collected when they leave the platform. In 1910, 31,000,000 of such tickets were sold (85,000 per day) and they yielded a revenue of \$735,000. This, of course, is clear profit.

FREIGHT RATES.

It is much more difficult, if not hopeless, to make any intelligent comparison of freight rates, because of the fundamentally different conditions. In the first place, we must recognize in the case of freight rates, as well as in passenger rates, wages, and cost of operation, that the purchasing power of money is greater in Prussia. How much greater, it is impossible to state with accuracy. In discussing comparative wages, the writer gave as his estimate that the cost of living in Berlin is from 60 per cent to 66 per cent of the cost in Boston.

In the second place, the policy of the government is to develop the traffic on the rivers and canals, and to prevent the railways from competing with the waterways. Thus, the lower grade commodities and other freight which will stand the slower movement go by water under a subsidy, since most canals and improved waterways do not yield enough in tolls to pay for interest and maintenance. The

proportion of water-borne tonnage at low rates is, therefore, much higher in Prussia than in the United States, and the Prussian ton mile rate is based on a much higher proportion of high grade commodities moving under the higher rates.

In the third place, there are no express companies in Germany, and with the exception of the smaller packages, which may go by parcel post, this class of goods moves under the high class rates in freight cars.*

In the fourth place, the average distance per shipment is just about half that of this country, consequently the element of terminal expense for each ton-mile is greater. The terminal expense, which is a large part of the total expense of moving traffic, is not affected by the length of the haul. It is just the same for a haul of 68 miles (the average Prussian haul) as for 138 miles (the average for the United States). The importance of this factor may be appreciated when it is realized that each ton of freight is handled through a terminal twice in Prussia to once in this country, since the average haul in this country is twice that of Prussia.* *

In the fifth place, the Prussian freight shipments are distinctly retail in character.

On the other side of the comparison, it should be noted that the conditions surrounding the process of shipping are more burdensome to the shipper. It is difficult to collect claims. Their movement is slower than ours. There are many complications in regard to classifications and tariffs, and the demurrage regulations are severe. In time of car shortage*** the free limit is reduced from the normal period of one day, to 12 hours, 8 hours, and even to 6 hours. The normal charge per day is 48 cents for the first day over the free period, 72 cents for the second day, and 95 cents for every additional day. The low capacity of the cars is to be borne in mind when comparing these demurrage conditions with ours. Besides this, there is a slight charge for the necessary printed forms. For instance, bills of lading cost \$2 per 1,000. Again, when open cars are used, and covering is necessary, a charge is made for the use of the tarpaulin sheets which

* The entire receipts of American railways from express in 1913 could have been added to their freight receipts without raising the average above 7.53 mills per ton mile. S. T.

** In New South Wales this item amounts to .30 cent; in Japan to .14. In Germany it would be midway between these extremes by reason of the difference in the cost of labor. S. T.

*** The car shortage becomes acute every fall and seriously affects the mining and manufacturing districts of Westphalia. In last December the shortage was 12,000 cars in the Essen-Ruhr district.

protect the freight. For distances of 63 to 125 miles, the minimum charge for two sheets is 72 cents.

No two persons, equally qualified to express opinions on the subject, will agree upon the weight to be given to the various factors, and any attempt here to devise a unit of comparison would only lead to profitless discussion. The writer will, therefore, leave the subject for each to form his own conclusion from an interpretation of the following statistics showing the freight traffic in Prussia in 1910; but will venture as his opinion in passing that freight rates are on the whole somewhat too high. The large surplus which is turned over to the state each year certainly is not made from the transportation of passengers. Freight shippers by rail are being indirectly taxed for the benefit of the state at large; while shippers by water have the benefit of state subsidies which come from the public at large — a conflicting situation.

It is commonly believed by those who advocate government ownership of railways that the Prussian freight tariff is the essence of simplicity, and if adopted here, would afford the solution to all of our freight rate problems. They are told that the Prussian rate is divided into two elements: (1) the terminal charge, and (2) the movement charge; the former graded for zones of 10 km. up to 100 km. (62.1 miles) and the latter graded for zones of 50 and 100 km. up to 500 km. (310 miles). This is correct so far as it goes, but there are so many exceptions to the zone tariffs that most of the seeming simplicity disappears. It is a common complaint among German shippers that the tariffs and shipping regulations are so complicated that they require experts to unravel them, and in the main they depend upon forwarding agents (*spediteurs*) to attend to all details of shipping for them. The exceptional tariffs which correspond to our commodity tariffs cover 61 per cent of the ton mileage, and have the lowest ton mile rate of 0.9 cent. Express freight takes the highest ton mile rate of 5.41 cents, and the average for all classes of freight is 1.248 cent per ton mile. The average for this country is 0.76 cent per ton mile, or 61 per cent of the Prussian average. We have a few railroads, however, with a ton-mile rate which equals or exceeds that of Prussia. Usually, where that condition obtains, it will be found that the freight traffic is largely local, or contains a relatively large amount of merchandise or other high-grade freight to which high-class rates apply, and also that the proportion of coal, iron, grain and other bulk freight moving under low commodity rates is relatively small. Such is the case on the New York, New Haven & Hartford.

CONCLUSION.

The writer's conclusion is that it is futile to attempt any exact comparison either of freight rates, passenger rates, expenses, or net returns in terms of percentages or of ratios of one country to those of the other country. When social and economic conditions are so essentially dissimilar, it is impossible to find a measuring stick which will permit us to gage the relative reasonableness of rates or the relative efficiency of operation. The real question is, "How well does the transportation system of each country measure up to the requirements of that country?" The answer must necessarily be based on opinion rather than on fact. In both countries we find those who praise and those who criticise the railways. But considering the Prussian situation alone, it seemed to the writer, from personal observation and study on the ground, that state ownership of railways in Prussia is successful and that the railways are operated with reasonable efficiency.

If it is granted that Prussia has met with substantial success in owning and operating its railways, it does not at all follow that government ownership in this country would be equally successful. That subject justifies a complete paper in itself, and we can do no more than touch upon it here in closing. Suffice it to say that nowhere are conditions more ideal for government ownership than in Prussia. It has a strongly centralized government. The administrative head of the railways — the Minister of Public Works — is appointed by and responsible to the king personally. Changes in that office, or in fact in any of the high offices, are infrequent. Civil service principles apply in the promotion of officials as well as of workmen. Military discipline obtains throughout the entire army of employees. It permeates the whole social organization of the country. The administration appears to be entirely free from graft. Little is heard of political patronage. In fact, government service there is regarded as highly honorable service.

Can we say as much for this country? Is our public service elevated to such a plane that we can safely trust it with the great enlargement of power which would come with government ownership of railways? Are we sufficiently insured against "pork barrel" methods of making and disbursing the budget? Are we sure that the quality and efficiency of service would not be lowered rather than improved?

He who would answer these questions in the affirmative is indeed an optimist!

GROWING FRICTION OVER MANAGEMENT OF PRUSSIAN STATE RAILWAYS

By "K"

TRANSLATED FOR THE LIBRARY BY FRANCIS A. BONNER FROM "VER-
KEHRSTECHNISCHE WOCHÉ," (JANUARY 4, 1913),

VOLUME VII, No. 14

[Two reasons are commonly given for the leadership of Prussian railways among state operated transportation systems; first the strong centralization of the Prussian bureaucracy; second, enormous expansion in traffic. But that even Germany, trained by heredity to the rigid control of a quasi military system of government, is beginning to chafe at the "insolence of office" is intimated surprisingly by this communication to a leading German railway publication.]

The discussion by Professor Blum of the relation of city governments to the management of the railroads in No. 9 of this publication will surely strike a responsive chord deep in the hearts of many higher officials of the railways. And indeed these free expressions, weighted with expert authority, are an emancipation.

The grounds for the strained relationship between city and railroad are so exhaustively handled that little remains to be added. If I attempt nevertheless to address myself to the same subject, it is because of a conviction that it can be no mistake if a good thing is expressed again and again, even at the risk of repetition. Right here there is in question a matter which we railroad men all feel but which until now has remained well nigh unuttered, and about which the public — I mean all who are without the railroad organization — know scarcely a thing. These are the grounds for the more and more increasing unpopularity of the railway organization among the public, not only among city governments but also communities, corporations, and other interests. A very important one of these reasons shall be the occasion of our discussion.

Is it not astonishing that an undertaking like the State Railway Administration, which in the forty or fifty years of its existence has performed so conspicuously, which has had so overwhelming a part in the economic expansion of Prussia and Germany and whose steadfast struggle with the whole strength of all its members to serve only the common weal no critic of opposite political party can deny — is it not astonishing that it, above all others, has so few friends? If, for

instance, the taxing authority, that never satisfied monster, is able to win scant sympathy from the public, that is humanly conceivable. Let it demand ever so little, still it is demanding, and that is a bitter pill. But the railroad? She, who day and night, every hour, nay, punctually on the minute stands ready to carry her haters according to their wishes with express or passenger train fleetness to the goal of their desires, who makes possible the exchange of goods in every form and at every distance, who grants herself never a rest and even on the greatest holidays labors without cessation to meet the commercial requirements of modern human culture, she finds such unbounded, unjust criticism! Many millions are devoted yearly to open cities and towns to commerce by means of the railroad and to extend and improve existing lines to a degree corresponding with the mounting requirements. The annual production of locomotives and cars numbers into the thousands. And for all these benefactions so much ingratitude, so many evil slanders over her shortcomings and insufficiencies? To be sure shortcomings exist. Even the Prussian State Railways are not a perfect system. Who with any discernment would deny it? Wherever without end new needs present themselves there must be striving without end to supply these needs; but that it is not possible to satisfy all wishes at once is self-evident, and not only in the case of railroads but everywhere throughout life it happens that the swift often must lag behind the more swift. Yet did the railroad possess in fact as many shortcomings as have been heaped upon her of late, things in our German Fatherland would have a different appearance from that they now present and this unexampled economic and cultural progress would have been an impossibility.

But this unpopularity is there: no one acquainted with conditions can deny it; and everywhere it stands in the way of the railroad in her activities. This unpopularity brings it about that whatever the railroad desires to attempt meets among the common people, among the cities, communities, and other interests, even before a move has been made, with a decided distrust. With prejudice they approach her new ideas and projects and they regard the railroad as a crafty enemy from whom nothing good can be expected. In my opinion the discussions in the commission of the House of Representatives on electrification of the Berlin City and Belt Railroad present a most instructive example of this state of affairs.

This raises the question whether reasons for these conditions do not exist which lie inherently in the nature of a railroad and the science of transportation as such, which even more, might arise just as well

in the case of any other management and which are to be traced not to the system itself but to a false principle of administration. And this is in fact the case. For, as Blum already has said so convincingly at the close of his discussion, **"a leading cause for the unfortunate relations between cities and the railroad is the overburdening of the higher railroad officials."** And if we desire to set this in somewhat plainer form we might say as well: "In the growing overburdening of the higher railroad officials is the explanation for the wider and wider spreading unpopularity of the railroad." For the higher officials, from sheer lack of time, are no longer in a position, despite most strenuous efforts, to cope in adequate degree with all the demands made upon them. With the expanding range of duties, as well in the case of many railroad directorships as of the great offices, the increase in number of places for upper officials has not kept pace. Moreover, it is well known what efforts have been made in recent years to lessen still further the number of higher officials through the institution of under officials and the introduction of "railroad engineers" into the management. From the fact that they are trying more and more to put the duties "of a more simple nature" off onto shoulders of lesser strength, one may judge, perhaps, that the overloading is realized in places of authority; but the means taken must, in part at least, be characterized at best as questionable.

The more forces work under one director in the railway management and the greater and more important the jurisdiction of a department head, the less thoroughly can he acquaint himself with the diverse questions coming before him, as is essential in the interest of the matter. In increasing degree, to instance a case, the division technical superintendent must not only care for the usual maintenance and improvement of the railroad structures of several operating divisions but also various departments of new construction work are placed under him. Let there be added to this the drawing up of some plan for the alteration of a great station or of an overloaded stretch of main track, and let there be loaded on him as a last straw the supervision of permanent way and structures, and a case of overburdening with work has been reached such as, alas, has come to be almost the rule. Even the allotting of one or several assistants can go only a short way toward the contemplated relief, for the superintendent still bears alone the formal responsibility for all decisions, and as a consequence all orders received or given must go through his hands. And so the demonstration of new work to the clerks and the reading and approving of completed affairs alone make an increasing demand upon his

working time. In addition there is the time consumed by conferences with colleagues and with the clerks and by business trips, unqualifiedly necessary in the interest of the railway's operation, yet the worth of which is more and more undervalued. And if almost the whole of the superintendent's time is consumed in merely seeing to it that "the machine does not come to a stop"—and an average working day of 8 to 10 hours is no longer the exception—when shall he find the time to devote himself to his second great duty, which consists of seeing that the railway's operation is maintained adequately to meet all demands on the dot?

Now, the strength of even a higher railroad official is limited, and while he is laboring just to get "to the bottom of his desk," the working out of great alterations or new pieces of construction must wait or all too frequently be left over for the hands of subordinates without the necessary guidance. But if the number of papers piled on him is startling in and of itself, it is increased by the establishment of the "memorandum," useful, it is true, in the handling of matters en masse, but which appears to be degenerating into an excess. Under the flood of most diverse business matters, the performance of which daily awaits the superintendent, joy in one's work is gradually stifled and time for thorough, effective activity consumed, to say nothing of time for paying attention to the progress of railroad science or modern technical questions. Naturally the matters which are put off often are the most important in that they attract public attention in the highest degree, because the interests of many are affected by them, and they demand the greatest attention and thorough devotion to the matter in hand. When, for example, a city makes inquiries regarding the condition of some matter, it must be put off with universal excuses. "Concerning the enlargement of the station at X," is the story then, "investigation will be made in due time. As soon as this is decided upon further advice will follow." Finally, however, the matter cannot be shoved off any larger, as a complaint to the minister has resulted or is expected. And now begins a hasty planning upon inadequate examination and not infrequently after insufficient negotiations with the city. Most likely the city receives the plan and the inevitable letter "begging that you may advise us as soon as convenient of your approval, we are most respectfully, etc." This approval nowadays, in most cases, without further ado does not come. More probably the city next avails itself of its right of thorough examination, wishes alterations, finds faults, and the first shove toward unpleasant relations has been given. And just for the sole reason that

it had been insufficiently acquainted with the plan beforehand, it plies the critical probe, naturally, with very special studiousness. There is unloosed an endless exchange of letters in which each party is frantically determined to concede nothing. When, finally, after long, fruitless effort, perhaps after the President has taken hold, the natural way to solution is reached, then the opponents on either side have become so agitated that it is difficult for them to regain a normal point of view.

In such experiences lies the mistake, which of late is made with greater and greater frequency, that efforts are not made in good time by means of verbal conference between city and railroad to secure an agreement on underlying fundamentals before the particular detailed working out of the plan. Without mistaking the unjustified demands of many cities I think still that under these circumstances more than heretofore a peaceful understanding could be reached. For it is a matter of experience that with abundant oral discussion even utterly insurmountable differences gradually smooth themselves out through the increase of mutual understanding. When I was head of a railroad division I sought to bring about as a fundamental continuous personal sympathy with all interested parties and, as I believe, not without results. The railroad laid its hands on immense landed property. **The desires of the Prussian eagle are legion and he knows well, as we are all aware, how to go about securing his desires in an emphatic manner.** Yet with more frequent conferring the railroad expert not only learns to recognize and understand better such views as are justifiable, but he becomes able after a while to convince the interested parties of the impracticability of other demands inconsistent with the operation of the railroad. On the heels of this insight, as a rule, follows renunciation of such impossibilities. In short, in this way much, if not everything, can be attained.

Ignorance concerning all things pertaining to the railroads is still very great in lay circles, and, as we have seen, not without fault on the part of the railroad itself. It must be her effort, then, to work toward clearing this away. **That can and must come about through more general personal sympathy with the public, wherever the interests of the railroad rub up against other interests.** A people which for decades has possessed a parliament simply will not be bossed about; but it will participate in the bossing in so far as it shall be advised accurately concerning aims and purposes. Every railroad official, even the higher executives, is called upon to assist in this with all the means at his command. And I believe it is not his choice if he

is less and less able to cope with this duty or if he has gradually become a stranger to the public. For he has simply and in a literal sense no more time for it. Circumstances have sharpened themselves to a point where a drastic change is necessary. The individual higher expert must in the end be relieved, and that in no small degree, so that time again will be accorded to him to busy himself with the everyday work of his calling, to master the great problems and questions of railroad science and management, and to win back the necessary feeling for the public. For this overloading with work we find not only in the case of the division jurisdiction cited as an example but also in many other jurisdictions and, by no means in least degree, in the great offices. An increase in regular jurisdictions — not in assistantships — of the management and the division of great offices is an inevitable necessity. Since 1895, the year of the last reorganization in the management, which began from the start with a colossal paring down of jurisdictions, not only has traffic mounted in an unexpected degree but, much more, there have arisen so many problems of a new kind for the railroad that we should no longer hesitate to undertake a thoroughgoing investigation of the existing system. For it may be questioned whether the increase of higher officials, especially the technical men, alone would bring the desired result. The scope of duties of many directorships, regarded as a whole, has so expanded that individual guidance is impeded. This granted, there is no reason in my opinion for not increasing the number of directors as well, not holding fast to the number of 21 directorships chosen seventeen years ago.

Against the possible disadvantage which might be brought about by an increase of executive places through this subdivision there stands the far greater advantage that the chief can direct his smaller jurisdiction much more easily according to his individual point of view and can push much more through with his personality. The objection could be made that through this the work of the ministry would have to be enlarged and that in the interest of unity of management it seems demanded that the number of reporting officials be reduced as far as possible. To say nothing of the fact that I do not believe this, a way out could be found even for it. The authorities of the railroad directorships could very well be enlarged. If, for example, under the present scheme separate projects of a cost of over 50,000 marks are laid before the minister for his approval, the railroad, in my opinion, would not suffer if this sum was raised to 100,000, yes, to 200,000 marks. In like manner the authority of the directorships could

be considerably increased without danger through conferring of powers to close deals in negotiations. And a widespread decentralization could be brought about in many other departments of the railroad.

But with or without thoroughgoing reform in management the increase in higher officials with independent authorities is a prime necessity which in the interest of the state railroad management and in the interest of the public must be brought about. Then will the railroad be adequate to the many-sided demands of to-day; then will the conflicts between railroad and private interests cease; then will such a state of affairs never again arise as the complete "missing fire" on the part of the railroads in the province of transportation.

MEDIATION AND ARBITRATION

By SETH LOW

President of the National Civic Federation.*

Perhaps the most significant work which has been carried to completion during the year is the preparation and passage of the Newlands Law to take the place of the old Erdman Act of Congress, providing for the mediation and arbitration of controversies between railroads and their train-operating employees. In my last annual report I had occasion to call attention to the controversy that was then pending between the railroads of the Eastern territory and the Brotherhood of Locomotive Firemen and Enginemen. Prior to this there had been a controversy, in the main concerning wages, between the railroads of the same territory and the Brotherhood of Locomotive Engineers. When this early controversy came to a crisis, it was submitted to arbitration outside of the terms of the Erdman Act, under which Act for fifteen years most railroad controversies had been adjudicated either by mediation or by arbitration. During this period of fifteen years a gradual change had been taking place, almost unconsciously and quite unnoticed, in the relations between the organizations of railway employes engaged in the operation of trains and the managements of the railways concerned. The Erdman Act was passed in 1898. It provided that two designated officers of the United States government might *ex officio* serve as mediators between the railroads and their train employes when their good offices were asked by either side. Mediation in this sense is entirely distinct from arbitration. Mediation involves merely the good offices of a third party in the effort to devise a basis of settlement of any disputed question, which basis both parties to the controversy will be willing to accept. Arbitration, on the other hand, implies, so far as the Erdman Act is concerned, that all efforts at mediation have failed, and that the points in controversy remaining unsettled are to be determined by a board of arbitration. Under the Erdman Act the arbitration board provided for, in every instance, was a board of three, composed of one member appointed by each party to the controversy, and of a third impartial member appointed by the government mediators if the parties

*From his annual address, from Abstract made for *The Railroad Trainman*.

to the controversy were unable to agree upon the third person thus to be chosen.

The Erdman Act remained upon the statute book eight years before it was successfully resorted to at all. Then, in a controversy between the Southern Pacific Company (Atlantic System) and the Brotherhood of Locomotive Firemen and Enginemen, the company asked for the good offices of the government mediators, which were accepted by the Firemen. In the following year the Southern Pacific Company and its telegraphers accepted arbitration under the Erdman Law. From that time on the services of the government mediators were called for with increasing frequency, being asked for sometimes by the railroad managements and sometimes by the railroad employes. In the beginning the controversies were almost uniformly between a single railroad and a single brotherhood; but, almost imperceptibly, the scope of these controversies enlarged. Answering to the tendency of the employes' organizations to work together and to include large groups of railroads in the same movement, conferences of railway managers have been developed, so that the railroads now make common answer to common demands.

So much of history is necessary to enable one to understand why the Erdman Act, despite its long usefulness, ultimately became unsatisfactory, and why the Newlands Act, which succeeded it, is better adapted to existing conditions. The controversy of 1912 between the locomotive engineers and the railroads of the Eastern territory was the first controversy involving all the vast railroad interests in this entire region. Both sides were willing to arbitrate, but the railroads pointed out that an arbitration board consisting of three members only was too small to pass upon the immense interests involved in the controversy in question, inasmuch as it threw the burden of the ultimate decision upon one man only. The locomotive engineers met this objection on the part of the railroads by agreeing to an arbitration outside of the Erdman Act.

This brings me back to the Firemen's arbitration, to which I referred at the beginning of this report. This controversy, like that of the Engineers, involved all of the railroads in the Eastern territory. Here, again, both sides were willing to arbitrate; but, in this instance, the Firemen insisted upon arbitration under the Erdman Law, while the railroads, as before, insisted that the board of arbitration provided for by the Erdman Law was too small. Ultimately the railroads yielded their objection. Arbitration was had under the Erdman Act, and it was in this respect notable that its findings were unani-

mous. While this controversy between the firemen and the railroads of the Eastern territory was in progress, the Order of Railway Conductors and the Brotherhood of Railroad Trainmen began to take action in their deliberate and formal way for the presentation of united demands on their part upon these same railroads of the Eastern territory. It became apparent to the officers of The National Civic Federation that, if a third controversy were brought to an issue while the Erdman Act remained unmodified, there was great danger of a breach between the railroads and their employes, which might do infinite mischief to the whole system of adjusting such differences by mediation and arbitration instead of by industrial strife. In the judgment of your officers, it was entirely certain at the beginning of the year that the conductors and trainmen for the demands they had formulated would insist upon arbitration under the Erdman Law; while the railroads were very likely to decline to arbitrate at all unless the arbitration board could be enlarged. Under these circumstances, your officers sounded the representatives of the railroad employes and some of the leading railroad presidents of the country for the purpose of ascertaining whether it would be possible, by mutual agreement, to reach such a modification of the Erdman Act as would be mutually satisfactory. The result was a conference held under the auspices of The National Civic Federation, at which the Newlands Law, substantially as it now stands upon the statute book, was agreed upon. In this day of industrial unrest all over the world it is worth while to emphasize the fact that these important railroad presidents and the representatives of all the railroad train-operating organizations were willing to sit down together for the purpose of devising an act which should embody the amendments that their experience under the Erdman Law had demonstrated to both sides to be desirable. The amendments agreed upon were important. (1) The United States Board of Mediation and Conciliation under the Newlands Law is independent of every government department and is responsible directly to the President of the United States. (2) This board has now the legal authority to tender its good offices, whether asked to do so or not by one or the other party to a controversy. (3) By the Newlands Law the arbitration board consists of six members, unless, in a specific case, the parties concerned agree upon three. (4) Every arbitration under the Newlands Law is based upon a carefully prepared stipulation, which limits the time within which the decision must be made, and which provides a clear definition of every question that is to be arbitrated; and the arbitration board must confine itself

to the matters submitted for arbitration. (5) As in the case of the Erdman Act, all witnesses are heard under oath, and the board has large powers for securing any information it may need.

Back of all the details of the law is the impressive and influential fact that both of the great interests that are affected helped to frame the law, and expressed in advance their willingness to work under it.

The United States Board of Mediation and Conciliation has been good enough to furnish me with the following memorandum showing that in four months this law has been the means of either settling, or of putting in the way of settlement, no fewer than twelve controversies, any one of which, in the absence of this law, might have led to industrial strife.

1. Forty-two eastern railroads and their conductors and trainmen.

2. Chicago and Western Indiana Railroad and Belt Railway Company of Chicago and their engineers, firemen and trainmen.

Request for mediation in this case was made by the president of the two roads July 28, 1913, and mediation began in Chicago August 4. A number of the points at issue, including the matter of seniority, were agreed to in mediation on August 6, and the remaining points submitted to arbitration by a board of three members, one of whom was appointed by each party and one by the Board of Mediation and Conciliation. The arbitration was concluded and the award filed September 16.

3. Southern Pacific Company (Pacific System) and its engineers, firemen, trainmen and conductors.

Request for mediation was made by the president of the road July 30, 1913, and mediation began in San Francisco August 9. All the points at issue were settled by mediation in an agreement signed August 18.

4. Central of Vermont Railway and its engineers and firemen.

Request for mediation was made July 31, 1913, by the grand officers of the organization in charge of the case, and mediation began August 11. A settlement of all matters in controversy was made by mediation in an agreement signed August 13.

5. St. Louis Southwestern Railway (Cotton Belt) and its conductors and trainmen.

Mediation was tendered on July 21, 1913, and was taken up in St. Louis August 7, and concluded August 12, all points at issue having been settled by mediation.

6. Chicago, Burlington and Quincy Railroad and its conductors and trainmen.

Mediation in this case was requested jointly by the representatives of the road and of the employes affected on August 12, 1913, and was begun on August 21 in Chicago. Failing to secure a settlement by mediation an agreement to arbitrate the matters in controversy was signed August 27. A board of arbitration of six members was agreed upon, two of whom were selected by each party to the controversy and two by the Board of Mediation and Conciliation. The arbitration was begun November 5, and has not yet been concluded.

7. Norfolk Southern Railroad and its engineers.

Application in this case was made August 17, 1912, under the Erdman Act, but was postponed several times prior to the passage of the Newlands Act. Request for mediation was renewed on August 2, and again postponed, having been taken up September 24 and concluded September 27.

8. Wheeling and Lake Erie Railroad and its telegraphers.

Request for mediation was made by the representatives of the telegraphers September 22, 1913, and mediation began November 3. Settlement of the matters in controversy could not be secured by mediation but an agreement to arbitrate was signed November 7. A board of six was provided for in the agreement, to be selected in the usual manner. The board will shortly be completed and the arbitration begun.

9. Chicago, Rock Island and Pacific Railway and its telegraphers.

Request for mediation was made by the representatives of the telegraphers on September 27, 1913, and mediation began in Chicago October 13. All matters in controversy were settled by mediation in an agreement signed October 27.

10. New York, New Haven and Hartford Railroad and its engineers.

The Board of Mediation and Conciliation, of its own motion, brought together Mr. Howard Elliott, president of the road, and Mr. Warren S. Stone, Grand Chief of the International Brotherhood of Locomotive Engineers, and out of this conference a settlement by agreement was reached.

11. Cincinnati, New Orleans and Texas Pacific Railway and others and their engineers, firemen and hostlers.

Request for mediation was made by the general manager of the roads October 25, 1913, and mediation began in Washington October 29. Active mediation in this case was, however, postponed until

November 10, in order to permit the two parties to harmonize the schedules and prepare them for presentation to the mediators. Mediation in this case is still proceeding.

12. Southern Pacific Company (Atlantic Division) and its engineers, firemen, conductors and trainmen.

Request by the company for mediation was made at noon November 13, 1913, a strike having been ordered for 7 p. m. of the same evening. Mediation was refused by the employes involved, on the ground that the matter in dispute was one not covered by the Newlands Act. The strike, which took place as ordered, was brought on by the refusal of the company to deal (in the adjustment of certain matters in dispute) with a joint committee of the four organizations, the company desiring to take these matters up with the individual committees of each organization. With the exception of a few passenger trains, the service of the road was discontinued until the morning of November 17, when the employes returned to work under an agreement with the road secured by the Board of Mediation and Conciliation.

Since the above memorandum was made, two additional cases have come to the United States Board of Mediation and Conciliation as follows:

13. The Chesapeake and Ohio of Indiana and its engineers, the request in this case being made jointly by the general manager of the Chesapeake and Ohio of Indiana and the Assistant Grand Chief of the Brotherhood of Locomotive Engineers.

14. The Seaboard Air Line and its conductors and trainmen, the request in this case coming from the officers representing the Order of Railway Conductors and Brotherhood of Railroad Trainmen. Neither of these cases has as yet been taken up but both will be acted on shortly.

Let me now say a few words as to the railroad situation in the United States as it has been borne in upon me in connection with the effort to frame and to secure the passage of the Newlands Law, and to administer the law in connection with a really stupendous arbitration. First of all, let me recognize the cordial co-operation of the President and Congress of the United States in passing this law at the special session of Congress. Cordial recognition is especially due to Senator Newlands, to Senator Kern, to Mr. Underwood, to Judge Clayton, and to Mr. Mann, the minority leader in the House, for their united efforts to bring about a prompt enactment of the law in the terms which had been agreed upon by the two interests which would

be called upon to act under it. The action of the House caucus in giving its consent, unanimously, to the consideration of the Act, deserves special mention, and also the helpful attitude of Secretary Wilson, of the Department of Labor. One may say, therefore, that the railroads of the United States at the present time are in this respect fortunate, that they **enjoy a well-considered and mutually acceptable law for the maintenance of industrial peace between themselves and their employes engaged in the operation of trains.** It has sometimes been asked why the same law may not be enacted with reference to other railroad employes. This was suggested when the Newlands Bill was under consideration at the White House conference; but it was pointed out by the President, and by the leaders of both Houses, that the authority of Congress upon the subject is determined by its relation to interstate commerce, and that it is by no means certain that the men employed in the shops in any given locality are employed in interstate commerce in any sense that would justify Congress in legislating for them. This is simply to point out, in a very definite way, that the industrial field which the states, as distinguished from the Federal Congress, must cover is a very large and very important field. No state legislation dealing with this subject, so far as I am informed, compares with the Newlands Law in its careful detail for the protection of both sides in an arbitration. I believe that if the states were to take this law for a model, with suitable modifications, they could eliminate a great deal of the industrial disturbance which now takes place. The serious conflicts that have recently taken place in West Virginia, in Colorado and in Indiana, emphasize the importance of this question.

It is idle, however, to blink the fact, that, **as a result of the processes of arbitration, the railroads of the country have been obliged to accept large additions to their operating expenses.** This result is not peculiar to the Newlands Law; for the same result followed the voluntary arbitration in the case of the engineers, and the arbitration under the Erdman Act in the case of the firemen, precisely as it has followed the recent arbitration under the Newlands Act in the case of the conductors and trainmen.

It does not follow that arbitration is necessarily a compromise. The findings of the Board of Arbitration in the conductors' and trainmen's case have been called a compromise, because the employes gained some points while the railroads gained others; but the fact is that the intermediate arbitrators were called upon to decide upon its merits, and they actually did so decide, according to their best judg-

ment, each question that was raised. As a result of that attitude, they sometimes voted with the employes and sometimes with the railroads. Unless one side or the other had been right on every point, in the judgment of the intermediate arbitrators, this outcome was inevitable. The award actually made, then, in this case, should not be regarded as a compromise, but as a decision on the merits as to every question submitted for arbitration.

It is sometimes asked, "What is to prevent the continual addition, without limit, to the fixed charges of the railroads under such processes as this?" **Experience only can answer.** It may be taken for granted, and should be taken for granted, that the railroad employes will ask for increased pay whenever they think circumstances justify it, for no body of men can work well to whom the door of hope is closed. But it is quite apparent that frivolous demands are less likely to be presented as the size of the group affected increases. Publicity also affects the issue. Further than this, each successive arbitration has an educational value, which may easily be greater than its direct value in the adjustment of the points disputed. It tends to educate both the railroad managements and the railroad employes as to what, in the judgment of impartial men, is fair as between the two. It might tend to better results on the average if each stipulation for arbitration were to provide that the demands to be passed upon should be granted or denied, precisely as submitted, and without substantial modification. Such arbitrations could never be compromises. This might limit the tendency of either side to ask for more than it expects to get, with the expectation that it will get something any way, which will be so much to the good.

A year or two ago the coal miners of the middle West asked for an advance in wages of ten per cent. This demand for an increase in wages was met by a demand on the part of the operators for a reduction in wages of ten per cent. The result in this particular case was the maintenance of existing rates. If each side, instead of presenting a trading proposition, can be persuaded to ask only for what it expects to get, the results obtained from successive arbitrations ought to be reasonably just to both parties.

FACTS CONCERNING THE SUNSET LINE STRIKE

From *The Railway Age Gazette*, November 21, 1913.

The engineers, firemen, conductors and brakemen of the Sunset Lines of the Southern Pacific went on strike on November 13 at 7 o'clock p. m. The strike involved the lines from New Orleans to El Paso, including branch lines in Louisiana and Texas, but did not involve the Houston & Texas Central and the Houston East and West Texas. The total mileage affected was about 2,400 miles. The strike was brought to an end on November 17.

The breach between the company and its employees was the result of a long series of disputes and negotiations pertaining chiefly to cases of discipline. On September 16, after having been negotiating with representatives of the Brotherhood of Locomotive Engineers, the Brotherhood of Locomotive Enginemen and Firemen, the Order of Railway Conductors and the Brotherhood of Railroad Trainmen, the company was notified of the formation of co-operative committees which had been formed to handle the grievances of the employees in both engine and train service.

The management indicated that it was willing, as it had been in the past, to confer with the representatives of the different organizations individually regarding grievances and other matters of interest to them individually, and to confer with them jointly regarding matters of interest to them jointly, but it refused to confer with them jointly regarding matters which were of interest and concern only to the individual organizations. In consequence, on November 12 notice was served on G. S. Waid, assistant general manager, that unless he consented to meet the committees in joint conference the employees concerned would withdraw from the service on November 13 at 7 p. m. Mr. Waid replied that as it seemed impossible for the company and the men to agree, the management, in the interests of all concerned, had formally requested the Federal Board of Mediation and Conciliation to use its good offices to, if possible, bring about an amicable settlement. No reply was made by the representatives of the brotherhoods to this communication, but on November 13 at 6:26 p. m., just 34 minutes before the time set for the strike, a communication from them was handed to W. B. Scott, president of the Sunset-Central Lines. This set forth that the employees had re-

ceived a telegram from G. W. W. Hanger, assistant commissioner of mediation and conciliation, Washington, D. C., offering the friendly services of the board to bring about an amicable adjustment, and that the representatives of the brotherhoods had replied that they would not concede that the questions involved were a matter for mediation and conciliation and that they were "therefore obliged to advise that the only possible way to avert a strike is for the company to agree before 7 p. m. this date to meet our joint committee for the purpose of discussing matters of difference." No other move was made until the strike was declared.

The action of the employees came at a time when there were large crops of cane and other products awaiting movement on the Sunset Lines, and owing to this and the precipitateness of the step taken — together with the fact that it was taken after the railway had appealed to the Federal Mediation and Conciliation Board and the employees had refused the intervention of that Board — public sympathy along the lines seemed to be with the management of the railway. The newspapers severely criticised the action of the employees. The strike was ended by the action of the management accepting the proposal of the Federal Board of Mediation and Conciliation that it meet the committee of the four unions, with the understanding, however, that if no agreement can be reached, the entire matter shall go before the board.

President W. B. Scott of the Sunset-Central Lines has given to the press statements covering the history of the negotiations and the nature of the road's differences with the employees. A statement issued by him on the evening of November 13 is in part as follows:

"Beginning with the first part of the current year, the company's officers commenced negotiations with the individual committees, as dates could be arranged, in an effort to dispose of such cases as the committees desired to present. After numerous conferences with the engineers' committee in February, March and April, settlement was reached on all cases presented by them for consideration, and the committee disbanded, apparently satisfied.

"Several conferences were held with the firemen's committee during January, February, March and April, and after a grand officer had been summoned, satisfactory settlement was reached on all grievances submitted by them.

"During June and July conferences were held with the conductors' and brakemen's committees individually and jointly and most of the cases disposed of, there being left unsettled but one case

presented by the conductors' committee and fifteen cases presented by the brakemen's committee. A grand officer of the brakemen's organization was called, and after additional conferences in August the number of unsettled cases was reduced to ten, some of which have since been dropped by that organization. The unsettled cases were held in abeyance by the committee, evidently for the purpose of injecting them into the present co-operative movement.

"In the meantime several engineer members of the firemen's organization were disciplined, and as the provisions of the engineers' agreement prohibited the firemen's organization from handling such cases, these engineers selected an engineer on their own seniority district, usually a chairman of the Brotherhood of Locomotive Firemen, to represent them. Conferences were held and letters were passed covering all of these cases, but as the discipline had been properly applied, the management declined to reinstate such engineers as had been discharged or cancel demerits that had been assessed. The cases were dropped, and in so far as the company's officers were concerned, were considered closed.

"In August the Brotherhood of Locomotive Engineers and the Brotherhood of Locomotive Enginemen and Firemen formed what they termed a Joint Working Board of the Brotherhood of Locomotive Engineers and Brotherhood of Locomotive Firemen and Enginemen, and immediately asked for a conference to discuss a long list of alleged grievances, which included cases that had previously been handled with the firemen's committee, all of the cases of engineer members of the firemen's organization, which had been handled to a conclusion in the manner prescribed by the engineers' agreement, and a number of matters that had not previously been presented. They also presented requests for changes in the engineers' and firemen's agreements, alleging that such changes were made necessary by the formation of the Joint Working Board. Conferences were held in September with the so-called Joint Working Board, and some of the grievances disposed of. Quite a number of the requests were considered unreasonable by the company's officers and no settlement was reached; the company also declining to reopen or reconsider cases that had heretofore been handled to a conclusion by the firemen's organization and by the engineer representatives from the firemen's organization. Notice was served on the company that grand officers would be summoned to the assistance of the committees and negotiations were suspended awaiting their arrival.

"The next heard from the organizations was the letter of Septem-

ber 16, signed by the chairmen of all four organizations, notifying the company of the formation of the co-operative committees, to which a reply was given under date of September 19, and another letter received September 25 reaffirming the former letter.

"On September 20 the general chairman of the conductors requested a meeting to discuss six alleged grievances, one of which had previously been settled by a former general chairman. On September 26 a supplemental letter was received submitting two additional cases. Owing to high water and other important matters requiring attention, the officers of the company were not able to set a date to discuss these cases immediately, and on October 17 a letter signed by grand officers of all four organizations submitting a list of sixty-seven alleged grievances, and requesting joint conference for the purpose of adjusting them, was received. This list of grievances included all of the unsettled questions with engineers, firemen and yardmen; the cases presented by the conductors which had not been discussed and were not properly on appeal to the grand officers; several cases that had been previously settled with the general chairman of the conductors, and even grievances which had not previously been presented by any of the organizations. It was obvious that the list of alleged grievances had been padded with everything which could be gathered up in order to make it appear that the organizations were very much aggrieved and which were intended to form a basis for the co-operative committees.

"The settlement of the grievances listed, however, seems to have been temporarily lost sight of and the sole aim and purpose of the committees now appears to be to force the company to meet the four organizations jointly so that in the future they will be in a better position to force their will in matters of pay, working conditions, administration of discipline, and rules of operation.

"The correspondence following receipt of this letter up to the time the committee decided to submit the matter to the men has been published, and clearly indicates the company's position with reference to meeting representatives of the four organizations jointly. Existing agreements with each organization, still in effect, clearly and specifically provide method of handling grievances, and by whom they may be presented. Neither party to these agreements can arbitrarily and without consent of the other party change any feature of the agreements, and an attempt to do so (except under methods prescribed in the agreements) by a strike ballot or otherwise, is clearly a breach of agreement.

"The list of alleged grievances presented in the committee's letter of October 17 includes request for reinstatement of eighteen discharged employees, and in some instances demand is made that they be paid for all time lost. Some of these employees have been dismissed for insubordination; others for incompetency and carelessness; one for drinking on duty, and others for responsibility for accidents and violation of the company's rules; all of which offenses are considered of a capital nature and generally throughout the country meet with summary action. Seventeen of the cases involve interpretations of the individual agreements, and may be honest differences of opinion, although the company's officers do not see how the language involved can be susceptible of any different interpretation than that they have placed upon it. Seventeen of the cases are not properly included in the present negotiations, for the reason that they have not been handled in the regular manner, some of them not having been handled at all. Four of the cases are reversals of decisions previously made and accepted by the regularly constituted representatives of the organizations. The balance of the cases are protests against present practice with reference to various reports, examinations, etc., and requests for privileges not heretofore enjoyed; all of which are outside of the various agreements and under no circumstances could be considered grievances.

"With other demands, the committees seek to force back into the service men who have been properly discharged for cause; to be relieved of making out reports made mandatory by federal laws governing locomotive boiler inspection and safety appliance standards; the discontinuance of the practice of re-examining train and enginemen on time table and train rules; the discontinuance of re-examination of engineers on machinery, and a protest against methods adopted for the re-examination of train and enginemen on color perception, sight and hearing.

"Rules are frequently altered, revised and amended; locomotive design is constantly changing, and improved appliances are being added, requiring a thorough knowledge on the part of the engineer. The re-examinations, to which objection is made, are not only extremely important because of their relation to the employee himself, but the safety of the general public which is entrusted to the company's care makes it absolutely necessary that not a single precaution be omitted or neglected. The practice is one generally commended and is approved and recommended by the American Railway Association. In fact, such examinations and rule enforcement, as

were found lacking on the New Haven road and for which that company was severely criticised in the report of the Interstate Commerce Commission on the Wallingford wreck, have been in effect on the Sunset Lines for many years without opposition, and only at this time are they objected to by the Co-Operative Committees of the four organizations.

"Under present conditions, numerous moves made by the company towards complying with Interstate Commerce Commission and railroad commission rulings, and to effect a greater degree of safety in operation to fulfill the growing demands of the traveling public, have met with the disapproval of the chairmen of the Grievance Committees, and they are making every effort to prevent them.

"Another practice complained of by the organizations, and listed as a grievance, is the method employed by the company in making efficiency tests, a 'Safety First' work inaugurated by these companies in 1902. This consists of checking employees in their observance of danger signals displayed at unexpected places and hours, with the expectation that those who are inclined to disregard danger signals or take unnecessary chances will be detected before, rather than after, an accident. These checks show whether or not flagmen promptly and properly protect their trains as required by the rules. If 'Safety First' was always considered, railroad accidents would be few in number and the consequences rarely serious. The Titanic disaster well illustrates the awful results that sometimes follow the failure to observe well-established rules of safety. These tests are absolutely essential, and have proven of great benefit not alone to the employees in demonstrating their efficiency, but in affording to the public and employees the protection they have a right to expect from transportation lines, active in the promotion of safety in operation.

"This will be more fully understood and appreciated by the record of the so-called Southern Pacific Lines, whose 9,768 miles of rail lines have during the past five years transported 209,674,539 passengers without a single fatality as the result of a train accident. As a further evidence of these companies' efforts in protecting the safety and welfare of their employees and the traveling public, the records will show that the various lines of the Southern Pacific have constructed, and have in operation, a total of 3,224 miles of track protected by automatic electric block signals, the most modern and effective system of train protection so far developed and successfully operated.

The mileage of road thus protected is greater than that of any other railway system in the world.

"In steel car construction, the Southern Pacific was the pioneer in an effort to promote 'Safety First' by developing and constructing in 1906 the first steel passenger coach built in America. Since that time their lines have added annually to their equipment, and now own and operate a large number of all steel passenger cars, with additional similar equipment ordered.

"The grievance committees have charged that discipline is too severe on these lines. As offsetting this the following may be of interest:

"On August 13, 1913, a letter was received from W. S. Stone, grand chief of the Brotherhood of Locomotive Engineers, advising that the engineers on these lines were complaining of the severe discipline that was being administered. In order to convince Mr. Stone that the complaint was without foundation, the records were gone over for the period of a year prior to that date and a statement prepared showing every engineer who had been dismissed, the cause of his dismissal, and whether or not he had subsequently been reinstated. This statement showed that a total of 58 engineers had been dismissed for proper cause. Notwithstanding this, 22 of them had been reinstated on pleas of leniency and as a result of previous good records. Since that time others of them have been reinstated for the same reasons. Of those remaining out of the service 12 were dismissed for drinking.

"It will clearly be seen that if any error has been made in the matter of discipline, it has been in the direction of leniency; yet this fact does not seem to appeal to the representatives of the organizations. When employees are guilty of dischargeable offenses or are so unfortunate as to make serious mistakes, proper discipline demands that they be removed from the service, yet the organizations seek to encourage carelessness and improper conduct by attempting to force the company not only to reinstate, but in some instances reinstate with full pay, employees who have been taken out of the service for proper cause.

"The direct personal interest of the traveling public in the maintenance by railroads of proper discipline of their employees and in the removal of restrictions in contracts between railroads and their employees tending to interfere with the exercise of proper discipline, has been brought home very forcibly by recent accidents to passenger trains resulting in the great loss of life, and traceable more or less

directly to the terms of employment which the organizations of trainmen are able to exact. In the recent report of the Interstate Commerce Commission on the accident on the New York, New Haven & Hartford Railroad at North Haven, Conn., Commissioner McChord most emphatically announced that 'Safety First' was the prime duty of railroad management, and that demands of organizations of employees or threatened strikes would afford no excuse for contracts which tended to lessen the employer's right to make and enforce all reasonable rules to promote care and efficiency of trainmen, to punish infractions of such rules, and to secure safety of operation, so far as human care and foresight can do. Responsibility for accidents cannot be shifted from the officials to employees by reference to contracts executed under threat of strikes.

"The position of the officers of the companies in respect to the pending demands of their employees has been in conformity with their duties as they are defined in the report of the Interstate Commerce Commission. If the companies' employees have the same regard for the commission's report and recognize the duties which railway employees as well as railway officials owe to the public, they will not persist in their demands. Certain it is that if the traveling public had a conclusive voice in the determination of the controversy, a due regard for its rights would lead to its approval of the stand taken by the officers of the railroads. The question in a nutshell is, shall the company buy its peace with employees at the price of the safety of the public?"

The company has made public the following analysis of the grievances which are given by the employees as the causes of the strike:

NUMBER OF CASES INCLUDED AS GRIEVANCES BY THE DIFFERENT ORGANIZATIONS.

O. R. C.....	10
B. R. T.....	19
B. L. E.....	20
B. of L. F. & E.....	14
Miscellaneous.....	7
1. Leniency.....	18
2. Interpretations of schedule.....	17
3. Not heretofore presented.....	17
4. Reversal of decisions previously accepted.....	4
5. Discontinuance Hours of Service report at terminals.....	1
6. Discontinuance receipting for engines at terminals.....	1
7. Discontinuance engineers making out fuel tickets.....	1
8. Discontinuance re-examination on train rules and machinery.....	1
9. Protest against method re-examination of men on eye-sight, hearing and color perception.....	1
10. Protest against correspondence.....	1

11. Protest against enginemen handling locomotive indicators.....	I
12. Protest against present method surprise tests.....	I
13. Protest against moving engines under steam without engineers.....	I
14. Request permission report for duty by telephone.....	I
15. Request boilerheads and side sheets of engines be covered.....	I
16. Request Mikado locomotives be weighed under service conditions....	I
17. Request ice be furnished at certain terminals.....	I
18. Request fires switch engines be cleaned at noon hours.....	I
19. Request seats on road engines for brakemen.....	I
20. Request for joint working agreement B. L. E. and B. L. F. & E.....	I

In an earlier statement President Scott said in part:

"In all matters of common interest these companies have never in the past, and will not in the future, decline to confer with those organizations. For example, the companies were already negotiating with the engineers and firemen jointly with a view to the making of a joint schedule. Similarly, the conductors and brakemen, whose duties are to a great extent common, are now working under a joint schedule.

"In matters of joint interest, such as the federal hours of service act, equally applicable to all, these companies have never declined to confer jointly with representatives of the four organizations involved.

"The purpose, therefore, of a demand that matters pertaining to the duties of brakemen and conductors shall be determined by joint action with members of a totally distinct and foreign service, and similarly with regard to matters affecting engineers and firemen, is to bring to bear upon these companies the joint and united force of the four organizations to force concessions which these companies, in justice to the public and themselves, and in obedience to the law, ought not and cannot make.

"During the present session of the Congress of the United States, at the suggestion of leading representatives of the four organizations, railway interests of the country acceding thereto, a Board of Mediation and Conciliation was constituted for the express purpose of determining issues of this character, and by wise and conciliatory mediation protect the traveling and shipping public from the inevitable disaster which follows a breach between a railroad company and its employees. These companies cheerfully recognized the fact that they are public service corporations and that their first duty is to obey the law and serve the public interest.

"They therefore promptly proposed a reference of the controversy to the board above mentioned, and it is with profound regret that they received notice from the representatives of the four organizations involved that all mediation was declined, and it was with

profound astonishment that they received notice that the membership of the four organizations would leave the service of these companies thirty-four minutes after notice that mediation had been declined.

"We state to the public that this is the sole issue involved in this controversy. A list of sixty-seven alleged grievances has been given out to the press. With regard to these, an analysis thereof will disclose:

"(1) That the majority of them, when tested by clear contract provisions, or admittedly long-established practice, are either without merit or have already been disposed of, or are not properly before the grand officers of the respective organizations and the general officers of these companies for consideration.

"(2) That, with two possible exceptions, none of the alleged grievances present matters of common interest to the four organizations, or affect the relations of the four organizations, as a whole, with these companies, which have always been willing (and I have specifically so stated in communications to the representatives of the four organizations involved) to meet representatives of all four organizations in joint conference where grievances involve matters of common interest to all of them. This would apply to the two exceptions above referred to, but would not apply to the remaining sixty-five alleged grievances, where no matter of common interest to the four organizations making the demand for a joint conference is involved.

"(3) That these companies have never declined, and do not now decline, to proceed in an orderly way, according to the methods specifically provided in existing contracts, and established by usage and practice of years' standing, to dispose of these alleged grievances, meeting the representatives of the organizations involved and making an honest effort to reach a fair adjustment.

"(4) That the demand made, upon the refusal to comply with which this strike has been ordered, is made for the purpose of forcing, through the combined power of four organizations, a compliance with demands which these companies submit are unreasonable and unjust, and, in many instances, inimical to the public interest.

"(5) That putting upon the grievances a construction most favorable to those making the demands, there is no issue, or issues, between any one of the organizations involved and these companies of sufficient gravity to justify the organizations in ignoring the public interest, which must inevitably suffer through the extreme action

which they have taken, and in peremptorily declining mediation tendered by the federal board."

Since the strike plainly was in the main an attack on the discipline administered by the management, it is desirable to know the causes and nature of this discipline. Space will not permit us to publish analyses of all the 67 cases, but we give below brief analyses of 30 of them. It is to be wished that every citizen of the United States might read these analyses, for they throw more light on the conditions affecting discipline on American railways, and the attitude of the railway brotherhoods toward it, than any other information which we have ever known to be put in print:

No. 1 is a demand for reinstatement of an engineer and a conductor with pay from date they were relieved from the service until date of their reinstatement. These men were discharged for operating a train over a bridge in course of repair, over which speed was limited by special instructions to four miles per hour, at a much higher rate, resulting in derailment and consequent heavy loss.

No. 2 is a demand for the reinstatement of an engineer and a conductor who were discharged because of violation of the rules of the company. The superintendent found these men on the main line with a light engine on the time of a passenger train without protection. They thereby created a condition which greatly endangered many innocent persons.

No. 3 is the protest of an engineer and a conductor against the assessment of demerits against their records for responsibility for a serious accident due to their having exceeded speed prescribed by special time table instructions; also a protest against another assessment of demerits against the same conductor on account of improper handling of live stock and a request for the reinstatement of this conductor, he having been relieved from the service on account of an accumulation of demerits.

No. 4 is a demand for reinstatement of an engineer discharged on account of responsibility for a rear end collision. A plea for leniency was originally presented, the responsibility of the engineer being admitted. On account of gross carelessness displayed by him the plea was denied.

No. 5 is a demand for reinstatement of an engineer discharged on account of having given up an engine on the road and reported it was not safe to move, when, in fact, the engine was put in shape to move a full train in a very short time.

No. 6 is a demand for the reinstatement of an engineer discharged for allowing his engine to run out of water, when all that it would have been necessary for him to do would have been for him to have fired up the pump boiler and pumped enough water to supply the engine. Investigation developed that the engineer had been drinking on the trip.

No. 7 is a demand for the reinstatement of an engineer discharged

for violating the company's rules by exceeding speed restrictions over a certain portion of the line, thereby creating danger of accident.

No. 11 is a complaint of enginemen against being required to make entries on a printed form after completing a trip or a day's work showing their hours of service and hours of rest, **which report is necessary in order to prevent violations of the federal hours of service law.** The case was handled by the joint working board, and as the reports were absolutely necessary, a demand for discontinuance of the practice was denied.

No. 14 is a complaint against engineers being required to make reports of fuel used on trips. These reports are necessary in order to keep a check on fuel, a very heavy item of expense, and to prevent waste. The practice is of long standing.

No. 26 is a demand for reinstatement of a conductor with full pay, who had been discharged for failing to comply with rules, thereby causing a serious rear-end collision.

No. 27 is a demand for reinstatement of seven passenger conductors who were dismissed because their services were no longer desired. The grievances of these men have never been discussed by the general committee of the conductors' organization with the general officers of the company, as required by practice of years' standing, and are not properly in the hands of the grand officers of the organization.

No. 28 is the protest of a conductor against assessment of demerits for violation of rules covering handling of train orders. The case has never been discussed with general officers of the company by the general committee of the conductors, and is not properly before the grand officers.

No. 29 is a demand for reinstatement of a conductor with full pay. The conductor was discharged for violating the rules by failing properly to protect his train, thereby inviting an accident. The case has never been discussed with the general officers of the company by the general committee and is not properly before the grand officers.

No. 30 is a demand for reinstatement of a switchman with pay. He was discharged for failure to report for duty at the time and place designated by the yardmaster as provided in the yardmen's agreement.

No. 31 is a demand for reinstatement of a brakeman with pay. He was discharged for refusing to pilot the engine of the train upon which he was working from a yard track to the roundhouse in the absence of the yard men.

No. 32 is a demand for reinstatement of a brakeman with pay. This man was relieved from train service because of his inability to read and write, making it impossible for him to pass written examination on train rules. He was offered employment in another capacity where his educational disabilities did not disqualify him.

No. 38 is a demand for reinstatement of three switchmen with pay. They were discharged for refusing, in succession, in an emergency, to act as foreman on a yard engine when directed to do so by the yard master. Insubordination meets with summary action on all railroads, and, in the interest of discipline, cannot be tolerated.

No. 39 is a demand for reinstatement of a switchman with pay. He was discharged for refusing, in an emergency, to act as foreman of a yard engine when directed to do so by his yardmaster.

No. 40 is a demand for reinstatement of a switchman with pay. This switchman was laying off and refused to return to work in an emergency, and when directed to do so by his yardmaster. Another case of insubordination.

No. 43 is the protest of a conductor against demerits for violation of rules governing handling of train orders.

No. 44 is a demand for reinstatement of an engine foreman with pay. He was discharged for failure to comply with the company's rules governing protection of his engine and cars against second class trains in yard limits, resulting in a collision.

No. 49 is a demand for reinstatement of a switchman dismissed for engaging in a fight with a night yardmaster. The case has never been discussed by any committee with the general officers, and they are not familiar with the facts in the case.

No. 54 is the protest of an engineer against assessment of demerits for interfering with a division officer who was engaged in making an efficiency test.

No. 55 is the protest of an engineer against assessment of demerits for failure to make time with a stock train. Investigation developed that the engineer did not perform his whole duty, or use his best efforts to get over the road.

No. 56 is a protest against the re-examination of engineers on train rules and mechanical re-examination of engineers. These re-examinations have been required from time to time for many years and are necessary in order to maintain the proper standard of efficiency.

No. 58 is the protest of an engineer against assessment of demerits for allowing an engine in his charge to fail on the road, when, by proper efforts, the failure could have been avoided.

No. 60 is a request for reinstatement of a conductor with pay. He was dismissed for violating positive instructions with respect to the sixteen-hour law.

No. 65 is a request that instructions issued September 11, 1912, by the Southern Pacific Company (Pacific System) relative to employees who took the places of striking shopmen be issued and made effective on the Sunset Lines. This case has never been discussed with any committee and the officers do not know what instructions are referred to.

No. 66 is a complaint against alleged misapplication of the Brown system of discipline. This case has never been discussed with any committee and the company's officers do not know what the complaint consists of.

No. 67 is a request that in making surprise or efficiency tests, the officials making such tests will change indicators, uncover headlights, turn markers, etc., themselves, instead of requiring employees in train and engine service to do so.

LABOR UNIONS AND THE RAILROADS*

BY J. O. FAGAN.

Author of "Confessions of a Railroad Signalman," etc.

From the beginning of time society and individuals seem to pass through certain clearly defined changes or stages of progress. In the Middle Ages, for example, the letting of blood was a sort of universal cure-all for every conceivable mental and physical ailment. In the case of a man supposed to be possessed with a devil, they pumped him nearly dry. Under a somewhat similar supposition, this is exactly the case with the railroads to-day.

Most everybody is taking a hand in the game. Illustrations permeate the railroad business from beginning to end.

For example, it is highly improper for a railroad to pay extravagant prices for sand lots, but in selling to a railroad the question of value cuts a very small ethical figure. It is the same thing with damages, rebates, professional services, and financial behavior in general — a railroad pays through the nose, a private citizen squeezes out his payments through a wringer. The man who would not either intentionally, incidentally, or instinctively demand from a railroad for his land damage, his grass fire, or his internal injury, modestly speaking, say twice as much as he would from his fellow citizen, such a man I say is more worthy of honorable mention than a Chinese ancestor.

Some time ago a farmer sued a railroad on account of the dust kicked up by the trains in passing his homestead. He contracted hay fever, so to speak, and was awarded substantial damages. Again, a young man in a hurry to greet his sweetheart tumbled prematurely off a passenger train running into a station. The result was a sort of twisted nose. By and by the girl "shook him" on account of his strange appearance. Whereupon he sued the young lady for breach of promise, and incidentally, the railroad.

Now, this kind of business is not confined to legislation or juries. It is a state of mind or an atmosphere that calls for reform just as well as do crooked financial operations. In Massachusetts the other day it was discovered that 25 per cent more people than the total

* From an article in the *New York Times*, May 25.

capacity of the train that was concerned in a certain collision had sent in claims and received indemnity.

Now, in this sort of hue and cry against railroads for their money or their lives the Interstate Commerce Commission occupies, as it seems to me, a very peculiar and questionable position. As a regulative agent in the matter of rates and so forth it exercises a reasonable and necessary function, but as a railroad manager or assistant manager the commission is a misfit.

The railroads to-day are suffering from a carnival of fines. If I drive a team up to a street crossing and the policeman gives me the tip and the horse is willing I go ahead. But if the horse happens to drop dead it is not at all likely the policeman will have me up in court for disobedience. But on the railroads you won't get off so easy. You cannot qualify or modify any kind of an interstate commerce law. Neither the elements nor the tremendous intricacy of the railroad business make a particle of difference in the execution of justice as applied to the railroads. Every offense avoidable or unavoidable cries to heaven for a fine. This rigid interpretation of their duty on the part of the Interstate Commerce Commission drives the railroads into the courts at inconceivable expense almost every day in the year to defend their exchequers from unreasonable legislation and overzealous Interstate Commerce Commission inspectors. But the Interstate Commerce Commission is not only unreasonably severe in hunting up troubles and imposing fines, but in its ignorance or neglect of the first principles of management it undermines the very foundation of the business upon which good service to the public is dependent.

Take a very simple and graphic illustration. Some time ago an express passenger train on the New York, New Haven & Hartford Railroad was derailed near Bridgeport, Conn. Fourteen passengers and employes were killed and forty-five passengers were injured in this accident. After a thorough investigation the Interstate Commerce Commission in its report summed up the situation as follows:

- (1) This accident was caused by a disregard on the part of the engineman of signals and rules provided by the railroad company to prevent the occurrence of such accidents.

- (2) The signals and rules provided by the railroad company for the prevention of such accidents were adequate had they been observed.

- (3) The tracks and switches were substantially constructed and safe for the train movement made had the rules been observed.

Here, then, in the words of the report, we have an absolutely sane and safe situation. The obvious duty of the commissioners

as public servants was to take up and look into the human or labor side of the problem and to strengthen the management in its efforts to maintain discipline and the proper observance of rules. But no — as a matter of fact this commission representing federal authority is more afraid of the human or the labor problem on railroads than the devil is supposed to be of a tailor. So in recommending preventives for such accidents the commissioners notified the railroad as follows:

That in all situations where accidents are likely to occur through the non-observance of enginemen of signals or rules calculated to insure safety, automatic train control apparatus should be provided to insure that trains will be brought to a stop in case the signals or rules are not properly observed.

Now, every switch, signal and bumping post in the United States is a situation where accidents are likely to and do occur through the non-observance of rules; so you can imagine the expense bill the commission, in dodging the human or labor problem on railroads, carelessly imposes on the management.

Furthermore, railroad managers to-day are threatened with imprisonment for failure to live up to this and other recommendations of a similar nature. The personnel of the Interstate Commerce Commission, it must be remembered, does not include a railroad manager either directly or indirectly, consequently the railroads are at all times being saddled with experiments, recommendations and orders from inexperienced sources; that is to say, from men who are not daily and unceasingly working out practical railroad problems from the managing side of the business. Here at last, then, we are face to face with the interests of the people in the labor problem on our railroads.

Now, on every railroad in this country there are two great streams or sources, either of influence or authority, by means of which it becomes everywhere possible to move trains, regulate traffic, secure revenue, pay wages and keep the different and complex departments of the railroad business in motion. I refer to the work, function and spirit of the manager and the employe.

Management, of course, should be conducted on business principles; that is to say, as scientifically as possible. But as a matter of fact the managing department on railroads is scientifically conducted only in spots. Management on railroads cannot be scientifically conducted because it is not clothed in any wide or sufficient sense with the necessary authority. In other words, it is actually under the thumb of a number of extraneous influences, such as public opinion, national and state regulation, and many other social and industrial

forces which criticise, attack and try to mold it from every conceivable quarter.

But now turning to the other arm of the service on railroads we find labor, as I have said, scientific in every fibre of its trunk and branches, for the very good reason that it has a "What to do" and "How to do it" department that has knowingly and very scientifically divorced itself from the outside world. In the history of the American railroads "labor" has never yet received even a jar or a check from public opinion, nor have the public interests been permitted to penetrate its solid and invulnerable front. The implied bargain between the rank and file and the executive department of labor places the latter in absolute and supreme control.

This implied bargain is not an industrial secret. It is to be read in every new schedule that is presented for the manager's signature. Shorn of its frills it reads something like this: "Get the money and shave the conditions." This is the scientific formula behind which is entrenched the solid vote of the rank and file.

The question naturally follows, What kind of people are these millions of highly organized and scientifically generated railroad men anyway? There can be but one answer. They rank very high, in fact they are among the very best and strongest fellows on earth. Only step outside the charmed circle of the railroadman's organized effort and you may well rub your eyes. True, these results have been obtained partially, at any rate, at the expense of society. Nevertheless, the verdict upon the whole must be, Good for him! He has simply treated his side of the question in a scientific manner. He has taken the scientific cue from Mr. Emerson, Mr. Taylor and Mr. Brandeis, and handled his concerns as these gentlemen in their arguments handle bricks and pig iron, and he has won out.

I have lived among railroad men for something like thirty years. As it seems to me from the educational, social and industrial standpoints, these men have almost, if not quite, solved the problem, as it concerns them, of wages and conditions. At any rate, they have solved the riddle of "What to get" and "How to get it." Industrially they are world wonders. For the ascendancy of labor on railroads is complete and the rewards are unlimited. What are known as the full crew bills afford a good illustration of the meaning and extent of this organized power. Some time ago when this legislation was getting under way a conference was held in a well-known manager's office. This manager said to the representatives of railroad labor:

"Look here, you need not go to the legislature for these extra

men. Just tell me on what trains in this state or on this system these men are necessary and I will put them on. I will simply take your word for it and we can stop the agitation right here and now."

"Thank you," replied the labor men, "but you don't understand what we are driving at; it may not be necessary on your system, but it is in Virginia, and we propose to standardize legislation just as we have standardized the payroll and the qualifications of the men."

These bills, then, in the different states where they have already become law, compel managers to employ certain men at times and at points when and where they are not actually needed. Now, when a railroad manager puts an extra man on a train when his services are called for, the safety situation is then and there strengthened. But, on the other hand, when blindly he puts these extra men to work on twenty trains when it is only necessary to do so on one of them, as would certainly be the case in Massachusetts, in New Hampshire, and in most of the other states under these laws, the safety situation has actually been weakened in nineteen cases out of twenty.

As elsewhere, but particularly on the railroads, a busy and a half-busy man together make a weak combination. When you find two men in a switch tower, on an engine, or on a freight train, doing the work that one man can reasonably handle, under such conditions, I say, look out for an accident. The ideal safety situation, then, is when the worker under proper supervision is kept reasonably busy. Some one should certainly have the authority to weed out of the train service every suspicion of loafing. In these full crew bills and in all other matters relating to service and safety the public is going to reap just what it sows and encourages in legislatures and otherwise.

This, then, is the industrial riddle on railroads and the power behind it which management has to face and overcome. The scientific process from the manager's point of view, as it seems to me, at any rate, is surrounded by a maze of delays, difficulties, and obstructions. His experience, his ability, his public spirit count for very little. A suggestion of his in the public interest may or may not amount to anything. What he can do is already standardized and regulated. What he would like to do is subject to delay and infinite wrangle.

Labor, on the other hand, has a simpler and more effective method of progress. A short time ago we had an illustration in concrete form, the newspaper account of which was as follows:

President Mellen and other officials of the New Haven road have thirty days in which to give answer to the Brotherhood of Railroad

Clerks on the pending wage and working rules agreement. Unless the road takes up this question with the clerks before the end of this period, a strike may be forthcoming. The lodges have sent in their ultimatum.

Practically nearly every department in the operating service on all railroads is run by rules and stipulations in this schedule. It covers wages, hours of service, and a host of working conditions. There are probably 1,700,000 employes on American railroads to-day, and of these at least 80 per cent are organized and quite aggressive. They are also in most cases working under contracts or schedules which are jealously guarded. These schedules have worked wonders in bettering conditions and making wages higher and fairer.

But as the labor organizations have grown larger and stronger, abuses here and there have got into this schedule which are not in the interests of the service or for the good of the public. One can get a good idea of the situation by glancing at the changes that have taken place in signal tower work in my own experience.

When I entered the service the situation was something like this: To begin with, a twelve-hour day and the pay about \$13 per week. Besides the lever work, the men were called upon to clean switches, fill and clean about fifty signal lamps, besides the necessary pole climbing in all weathers. To-day we attend to the levers and to the train despatchers on the telephone, and that's all. We have an eight-hour day and a flat rate of about \$21 per week.

But there is another way of looking at this picture. In times gone by the pay for the "tricks," as they call them, was graded according to the work and responsibility; that is to say, the day man got a little more money than the "middle trick" man, and he in turn got a little more than the night man.

To-day the tower is simply looked upon as Class No. So and So. Men, conditions and pay are all on a level, and in our last schedule the day man of thirty years' experience is called upon to change off periodically with the night man in order that the difference, industrially speaking, between the latest arrival and an expert may be utterly obliterated.

Again, time was when, if a towerman was incapacitated for heavy tower work by reason of age or sickness, the superintendent could look over his division and place the man somewhere else, according to the man's ability and merit. To-day a night job on a crossing is about all a superintendent can offer such a man. He, the towerman, must remain on his own division in the tower service

actually cornered in his little group. There may be a dozen vacancies on another division of the road, but they are not for him and the superintendent cannot help him. Every other avenue of organized labor on the railroad is closed to him in the same way. If there is no vacancy in his little group he can starve.

This situation has been brought about in the interests of the organization as a whole. It is typical of the fate that threatens the very first principles of social and industrial progress which American democracy is supposed to recognize and encourage.

Now, whatever our opinions may happen to be about the merits of the labor situation on the railroads, all will agree that the strike is to-day the universal weapon for enforcing concessions of any and every description. It is the "only way." In the home, in the schools, in married life, as well as on the railroads, it matters not which way you look, this universal "holdup" meets you at every turn.

The policy it represents says to the common people, to the great mass of consumers, "Be with us or go hungry"; to the traveler, "Be with us or walk." To the politician as well as to the inoffensive voter it offers an unquestioning alliance or the private life. To employers, managers, inventors, pioneers and capitalists it holds forth no olive branch or alternative. To all non-affiliated industrial units such as these it merely suggests a return to the wood-pile.

Under present conditions on railroads surrender under strike threats of this nature means bankruptcy; resistance means stagnation or chaos. What is to be done about it? This is the railroad riddle the people in this country have to face and answer in some way. The situation has recently been amusingly illustrated by the Kansas Legislature in its praiseworthy efforts to straighten out conflicting interests at a railroad crossing. As published in the newspapers, the proposed remedy is as follows:

"A bill is pending in the Kansas Legislature to 'regulate' the movement of trains at railroad crossings. 'When two trains approach a railroad crossing,' says the bill, 'both shall stop and neither shall go ahead until the other has passed by.'"

Such, as it seems to me, is a good illustration of the stagnation which threatens society on account of its spiritless and sentimental handling of the industrial situation. Where I come from there isn't enough moral courage exercised in the arbitration of industrial disputes to spank a two-year old baby.

Now, I have followed, or tried to follow, the labor situation on railroads in some of its phases and ramifications from the first ap-

pearance of humane public interest in the business clear up to the present overshadowing dilemma of the strike. Looming up in the distance there is a fast-approaching deadlock. As a lasting proposition, regulated management and unregulated labor on railroads are inconceivable. What is needed, then, at the present day, is not less humanity or less justice, but more independence and backbone in public opinion. Freedom of speech in this country is nothing but a national "jolly" so long as people are afraid to spell "labor union" out loud or discuss the industrial situation without locking the door and stuffing the keyhole. As never before in the history of the country, democracy to-day needs the courage of its convictions. Graft on American railroads is a dying cause; the problems of service and labor are living and growing issues.

No form of socialism or government ownership will ever settle the problem of service on American railroads. People who look upon ideal working conditions and a liberal pay-roll as a settlement of industrial unrest are invited to study the situation on our railroads.

God help the government when it is called upon some day to tackle this riddle! In trying to enforce satisfactory service, in trying to adjust the pay-roll in the interests of all concerned, in its interpretation of rules and regulations, in its effort to manage the management and protect the interests of the employes, and finally as an arbitrator between conflicting classes and interests government interference on our railroads, so far, is a recognized failure. The blight of political influence and class legislation is over it all.

On the railroads to-day organized labor has the government, the management, and the people's interests all together on the dead run, and there can be no constructive rearrangement of the situation until the people recognize this primary fact. In all labor questions on railroads, in the very nature of the political situation, the United States government has always been represented by an "olive branch" diplomacy.

All questions of service, management, and the pay-roll are now being settled by an appeal to this kind of a tribunal. Every controversy or difference of opinion on the railroads to-day is finally brought up for mediation under the Erdman act, and these government mediators have laid down the law in such matters very emphatically in something like the following language:

"In the interests of the people, as we think, we have absolutely nothing to do with the right or wrong in these controversies; our business is simply to keep the wheels moving."

This is surely a pretty hard proposition for a manager to buck against when you ask him to be responsible for the safety of the traveling public. And yet this is exactly what arbitration of every description means and has meant to the railroads for the past ten years. So far as the railroads are concerned, arbitration in this country has always had a political "weather eye," and the sooner public sentiment catches on to this fact the better it will be for the interests of the people at large. At the same time I am aware that an ethical awakening in this direction has been the distinguishing feature of the activities of the public conscience during the past year.

For the future, as it seems to me, the prospect is hopeful. The people now want to know the truth about the railroads, and especially about the accident situation. The principle of keeping wheels moving regardless of right and wrong will not satisfy the American public indefinitely. On the railroads to-day, gentlemen, if you want to shave conditions, swell the pay-roll, paralyze the management, and hoodwink the people, all you have to do is to threaten a tie-up. This is neither tradition nor prophecy, but the actual situation at the present day. It seems a pity, however, that it should now be necessary to wreck the railroads in order to get at the truth.

Just at present, then, these railroads need intelligent criticism, and in the matter of service they deserve the moral support of public opinion. The railroads to-day are being rent asunder by conflicting ideas and conflicting interests. From within and without these forces are working directly and potently against the service. Under these circumstances there can be no solution of industrial or operating problems on American railroads, except through the medium of public opinion exerted along ethical lines.

Reformation on railroads should be constructive and helpful. Every unit of interest should get together on this platform. The actual necessities, financial and otherwise, of the railroads to-day should rally everybody connected with them to their support.

WORKMEN'S COMPENSATION

BY FRANK V. WHITING.

General Claims Attorney, New York Central Lines.*

The first state compensation law in this country seeking to cover completely the examples of European experience, and to impose liability to pay based upon the hazard of employment, was the Montana Mining Act of 1909. This law, afterwards declared unconstitutional, created a state accident fund provided by employers and employees to cover workmen in and about mines.

In May, 1910, before the Association of Railway Claim Agents, I said: "Are we not in this country rapidly drawing to the point where compensation, or rather damages, will have to be paid for all injuries caused in the industrial and transportation fields through negligence? In other words, must we not concede that the defences of "fellow-servant," "assumed risk" and "contributory negligence" are not only rapidly but lawfully being swept away? This being true, it is but a short step across the line to the point where all accidents shall be compensated, even where there is no fault on the part of the employer or his employees. The demand for this sort of legislation is greater than you think. There is a strong current of public opinion in favor of it and I question whether employers generally would be opposed to such legislation if it is reasonable. The objection is not so much to the principle of compensation as the extremities to which we may be forced through lack of understanding by our legislators and the insistent demands of labor."

In that month this Empire State enacted the first state elective compensation law, dealing with employments generally, which, although a "dead letter," is still in force. The compulsory compensation law, which was later declared void by the Court of Appeals, was enacted the month following. It is of interest to know that a comprehensive elective act was introduced into the New York Legislature fifteen years ago.

Few men have spent a great deal of their time studying compensation laws in detail. Many of those who have given the subject more than passing notice have not troubled themselves with the most im-

* From address before New York State Bar Association, January 31, 1914, on the "New York Compulsory Law."

portant feature of such laws, viz., the cost of compensation, the administrative features having been paramount.

When we started the study of compensation, we were, and in fact still are, largely misled by opinions based upon the present system of damages as revealed to us in court cases, ignoring to a great extent what should have been self-evident; to wit, that the number of actions represent but a beggarly part of the total injured. In a statement issued by the State Insurance Department last month it is said, "Of the money that has been expended by the employers because of accidents, not more than one-third has ever reached the injured employes, the rest being used for expense and particularly for the expense of prosecuting and defending suits." Such a statement is not based upon any adequate information, and would be repudiated by most any manufacturer employing considerable labor. Even before the first compensation act of this state was enacted, two great corporations had voluntarily adopted a system of compensating all injured employes regardless of fault; and other employers, and especially railroads, were in a large measure doing the same. The liability of railroad companies was enlarged from time to time by special legislation in the various states, and their responsibility rapidly outstripped that of the industrial employer. When you consider that of all the employe accidents on the New York Central Lines, just a trifle over one per cent are sued, a small percentage of which are tried, you will appreciate how unfair it is to make deductions as to the whole from court cases. At least eighty per cent of our disbursements for injuries to employes reaches them without waste. No doubt this proportion is larger than in other employments, especially where the liability has been insured. At first we were told that if we conserved the economic waste attaching to the so-called present system we could pay reasonable compensation in all cases without increasing the cost. The New York State Compensation Commission learned that this waste was not of sufficient proportion to provide even moderate compensation, and it was then suggested that the cost be increased fifty per cent, and the New York laws of 1910, with moderate schedules, were drafted with this end in view. Inasmuch as compulsory laws were apparently of questionable validity, legislatures were powerless to impose absolute liability and sought through the enactment of elective laws to induce, and in fact in most instances to coerce, both the employer and the employe to come within the laws. While these laws, it is true, held on the one hand certain alleged mutual benefits, yet on the other, penalties were imposed to compel acceptance. It

is obvious that such laws would be rejected unless the benefits to be derived therefrom were superior to the disadvantages or burdens imposed. An employer, even with all defenses removed, could afford to reject if the schedule was exorbitant. This was the attitude of employers generally under the Ohio elective act, which was almost a complete failure. However, the laws of Michigan and Massachusetts, containing reasonable schedules of compensation, are the most successful elective laws in the country.

After all, the real purpose of these laws is to provide for the needs, and recoup the economic loss, of those injured and killed in work accidents; to take the burden from society at large and impose it directly upon the industry and indirectly upon the consumer; to secure payment; to pay promptly and without a lot of red tape and at a minimum expense, and they should deal justly and equitably with the employers as well as the employees.

An equitable, scientific and proper schedule of compensation is indeed difficult to construct, complex in its application, and easily disarranged, but when based on certain definite and well-known factors becomes as intricate and delicate a thing as that wonderful hunting ground spun by the ambidextrous *Eperia*, the common garden spider,—symmetrical, delicate, geometrical, responding to the slightest disturbance in the remotest corner. The spider never patches its torn and broken web, but builds for its use an entirely new one, correct in the minutest detail. I shall describe the fundamental and essential factors of such a schedule and show how a change in one feature may produce unfair and exorbitant compensation in others.

First, the limitation placed upon the monthly wage, the excess of which shall not be considered in computing compensation.

Second, the percentage of wages to be paid.

Third, the limitation upon the amount of compensation, periodically and in the aggregate.

Fourth, the limitation in time during which payments are to be made.

Fifth, the contingencies other than the lapse of time upon the happening of which payments cease, such as termination of disability, the death of the workman or his beneficiaries, children reaching the age of self-support, and the remarriage of the widow.

Sixth, the waiting period — the time following the injury during which no compensation is payable.

We have, then, various important factors which, considered as a whole, determine the aggregate cost to employer and compensation

to the employe; to wit, limitations in wages, in percentages of wages, in amount of compensation, periodically and in total, in time, and in contingencies either known or unknown, and in addition we must consider the expense of administration, expense for medical and surgical attention and of funerals.

It will now be clear that when a schedule has been properly prepared, that a change in one important factor will affect the whole and be immediately reflected in an increase or decrease in the amount of compensation. Then again the various periods of time during which compensation is payable for certain specific injuries are so correlated that a change in one of necessity requires a change in all. The schedule in our state law includes all of these features except a limit in the total amount of compensation. Obviously, a limitation in wages or of compensation paid periodically is in effect the same. We find for all disabilities a limitation of \$15.00 per week, except for the loss of a limb or an eye, where it is \$20.00; in death cases a limitation in wages of \$100.00 per month; and here we see that a limitation in amount would not have the same effect as a limitation in wages, for the reason that the percentages payable vary with the number of the next of kin and the extent of their dependency, and a limitation in the amount of compensation only would result in a disproportionate distribution. In fourteen states, viz., Connecticut, Iowa, Massachusetts, Michigan, Minnesota, Nebraska, New Jersey, New Hampshire, New York (elective), Oregon, Rhode Island, West Virginia, Wisconsin (except railroad service), and Washington, the limitations in compensation or wages are such that the maximum weekly payment is \$10.00 or less; in Illinois and Ohio, \$12.00; and in Kansas, Nevada (1913) and Texas, \$15.00.

Compensation for PERMANENT PARTIAL DISABILITY is greatly in excess of that in other states, due principally to the payment of two-thirds of the wage impairment, in some instances for life, and owing to the unusually long periods over which payment of two-thirds of the wages (not the impairment) is required, together with the maximum of \$20.00 in weekly compensation for loss of limb or eye. Ohio is the only state with as high a percentage, but with shorter periods and maximum weekly compensation, forty per cent less for such loss. In fifteen states, viz., Arizona, Connecticut, Illinois, Iowa, Kansas, Massachusetts, Michigan, Minnesota, Maryland, Nebraska, Nevada (1911), New Jersey, New Hampshire, Rhode Island and West Virginia, the compensation is on a basis of fifty per cent of the wages. In Texas it is sixty per cent, and in Wisconsin and California sixty-five per

cent. Wisconsin is the only state where the percentage of wages paid lessens by reason of the advanced age of the workman at the time of the accident.

Special attention is called to the maximum for the loss of an arm in the various states, compared to \$6,240.00 under the New York law:—

Arizona	50% wage impairment up to \$4,000
Connecticut.....	\$2,080
Illinois.....	2,400
Iowa.....	2,000
Kansas.....	50% wage impairment 8 years
Massachusetts.....	50% wage impairment 300 weeks, and not exceeding \$500 additional
Michigan.....	\$2,000
Minnesota.....	2,000
Nebraska.....	2,150
Nevada.....	3,000
New York (compulsory Act)	6,240
New York (elective Act).....	50% wage impairment 8 years
New Jersey.....	2,000
New Hampshire.....	3,000
Ohio.....	2,400
Oregon.....	2,400
Rhode Island.....	50% wage impairment 300 weeks, and not exceeding \$500 additional
Texas.....	50% wage impairment 300 weeks, and not exceeding \$600 additional
Washington.....	\$1,500
Wisconsin.....	3,000
West Virginia.....	1,456

When an employee receives a permanent partial disability, such as the loss of an eye or limb, the employer must pay in the end a definite amount, so that there is no incentive or advantage to re-employ. Then, there is the obvious deterrent in providing the injured with a definite and substantial income for from two to six years, which may, with insurance, equal previous average earnings, and even without, be sufficiently large to tempt idleness and an indisposition to readjust to the changed condition, thus creating an unnecessary economic burden. A provision to pay permanent partial disability cases on a basis of the impaired earning capacity for a reasonable period would insure re-employment in many instances, especially if the law is so arranged that compensation for subsequent injury of the same character, which, coupled with the previous injury, causes total incapacity, will be paid for as such and not as permanent total for life.

For PERMANENT TOTAL DISABILITY, the law requires the payment of two-thirds of the wages, not exceeding \$15.00 per week, during disability, which in most cases means for life, and in nearly all, a period of many years. The aggregate amount which a man aged thirty would

receive for permanent total disability, living his expectancy, would exceed \$27,000.00. In fourteen of the state laws, viz., Arizona, California (elective), Iowa, Kansas, Connecticut, Massachusetts, Michigan, Minnesota, Nevada, New York (elective), New Jersey, New Hampshire, Rhode Island and Texas, restrictions in time or money covering permanent total disability limit the aggregate payments to from \$3,000.00 to \$6,240.00. In seven, the amounts are \$4,000 or less; viz., Arizona, Iowa, Massachusetts, Michigan, Minnesota, New Jersey and New Hampshire. The New York law, paying two-thirds of wages during disability, is more liberal than any other, as, with one exception, those named pay but one-half. Ohio, only, pays as high a percentage, but the maximum weekly payment is twenty per cent less. In California and Nebraska the rate is reduced to forty per cent after a certain period. Small life pensions are paid in Oregon, Washington, West Virginia and Illinois.

The percentage payable in DEATH CASES is determined with reference to the number, age and relationship of the next of kin, running from fifteen to sixty-six and two-thirds per cent, with a limitation of \$100.00 per month in wages.

In Minnesota, New York (compulsory act), New Jersey, Oregon, West Virginia and Washington, the compensation to beneficiaries is graded in accordance with the kinship and dependency; in the three latter states on a pension basis, and in the three former on percentage of wages, New York being the only state, except those in which pensions are paid, where payments are made to widows during widowhood or to children until the age of self-support without a limit in the aggregate. This is the most liberal compensation law in the world in this respect. Washington and Oregon alone pay during widowhood and until children are sixteen. In the former, the maximum periodical payment is but little more than half of what it may be in New York State, and in the latter twenty-five per cent less. In Arizona, widows are paid during widowhood and children until eighteen, but from a lump sum held in trust and in no event can this amount exceed \$4,000.00. We are not satisfied with providing for the necessities of the beneficiaries, but must needs furnish a dowry, the aggregate of two years' compensation, in case the widow remarries. Provision should have been made to pay widow and children during a reasonable period; at any rate, children should not be paid after reaching the lawful age of employment.

It is of interest to know that in the case of an employe leaving a widow aged thirty, female children aged five and three, and twins

aged one year, the aggregate amount which they might finally receive on the basis of \$100.00 monthly wages under the New York law would be over \$19,000, the widow alone receiving in excess of \$12,000.

There are fifteen state laws which limit the compensation for death to one-half of the wages, viz., Arizona, Connecticut, Illinois, Iowa, Kansas, Massachusetts, Michigan, Maryland, Nebraska, New York (elective), Nevada, New Jersey, New Hampshire, West Virginia and Rhode Island, and in eighteen the limits in aggregate amount range from \$3,000 to \$5,400, as follows: Iowa, Massachusetts, Michigan, Minnesota, New York (elective), New Jersey, New Hampshire, Rhode Island, \$3,000; Connecticut, \$3,120; Illinois and Nebraska, \$3,500; Kansas, \$3,600; Ohio, \$3,750; Arizona, \$4,000; California (elective and compulsory), \$5,000, and Texas, \$5,400; in Maryland it is three years' wages.

In determining the percentage of wages to be paid as compensation, the legislature has apparently assumed that workmen generally are not only improvident, but fail to protect themselves by insurance or otherwise.

I find in the digest of the law, furnished by the Insurance Department, this statement: "In fact, perhaps the most beneficent effect of the compensation system is the increased safety which results because of proper discipline and the installation of preventative devices, when the cost of accidents is laid directly upon the employer." The burden of expense heretofore imposed upon the employer has been of sufficient weight to obtain from him at least a fair amount of accident prevention, and increasing the burden will not result in a material betterment. Many corporations have exceeded legal requirements in furnishing safety devices, and in protecting and educating employes in accident prevention. When it is considered that **in the transportation service, less than ten per cent of all accidents to employes are due to defective equipment, conditions or appliances,** it will be seen how little weight can be given this proposition. Even though an employer is induced to exercise greater care by reason of an increased cost, how will the compensation to an employe insure a higher regard for safety on his part? Mr. Harold G. Villard, of this Bar, in writing on the subject as to Germany, states that "side by side with this diminution in the stamina of the work-people is to be noted a greater degree of carelessness and of indifference to the consequences of accident. The feeling that a high pecuniary compensation is always to be had makes the dangers of his occupation appear less important to the factory hand and accounts for his frequently

neglecting the commonest precautions. In 1890 the number of workmen injured per thousand in Germany was 30.28; in 1911 it was 52.83. The percentage of industrial accidents due to the faults of workmen has risen from 26.56% in 1887 to 41.26% in 1907. In spite of all safety and accident preventing devices, the number of accidents — both actually and relatively — is steadily rising.”

It is obvious from what has been shown that employers will be met with a substantial and constantly increasing cost in compensation over the present practices — not only will the average cost be much higher, but all accidents must be paid for, and others will be added through malingering and a liberal interpretation of the law. In Michigan, compensation has been allowed for death, off the premises, by lightning and for disability due to lead poisoning, and in Washington for a snake bite. Exaggeration as to the extent of the injury and time of disability is common among all classes of people, and where compensation is as generous and certain as under the New York law it is not to be expected that all injured workmen will be above temptation in this respect, although it is worthy of note that with the waiting period of two weeks, opportunity for fraud in trivial cases is largely eliminated. The cost of administration itself will add greatly to the sum total, to say nothing of the medical, funeral and other expenses, which, experience has shown in states where moderate schedules are in force, have been in the first year equal to from forty to fifty per cent of the compensation allowed.

I have covered the principles involved in a comprehensive compensation schedule and have shown how they were applied to the New York law, but have avoided any definite estimate as to the manifestly heavier burden which will be imposed upon the employers of this, beyond those in the neighboring states. It is obvious that the aggregate compensation, with the expense of administration, etc., will be considerably greater than the sum total of all settlements, judgments, fees, court costs and the like, under the present system.

FAIR PAY FOR CARRYING THE MAILS

BY RALPH PETERS

President of Long Island Railroad Co. and Chairman of the Committee of Railway Mail Pay of the American Railway Association.

The railroads must themselves properly conserve their sources of revenue by making every service rendered by them contribute reasonably to their earnings.— Interstate Commerce Commissioner Harlan, in *Industrial Railways*, Case 4181, January 20, 1914.

The railroad companies of the United States claim that data compiled by the Post Office Department itself shows the railroads to be underpaid by \$29,000,000 annually for carrying the mails.

The railroads claim that according to their own calculations they were underpaid at least \$15,000,000 per annum before the parcel post was instituted.

* * *

The railroads maintain that their treatment by the Government has been unjust for many years past. That no proper recognition has been given of their increased services to the public may be seen in these facts:

The postal revenues in 1907 were \$183,585,005.57; in 1912 they were \$246,744,015.88, an increase in the five years of \$63,159,010.31.

The railway mail pay for 1907 was \$51,008,111.32; for 1912 only \$50,703,323.02.

Therefore the railway transportation of the mails — the chief factor enabling the Post Office Department to earn this increased revenue of \$63,000,000 — not only did not receive anything extra for the additional mails but suffered a reduction of \$304,788.30.

This was before the parcel post service was established on January 1, 1913.

* * *

THE PARCEL POST.

The parcel post was established on January 1, 1913, with a weight limit of 11 pounds, and up to July 1, 1913 (six months), the railroad companies received no compensation whatever for carrying this additional burden.

On July 1, 1913, an adjustment of pay was made to the railroads on a basis of weight for those railroads having a weighing of the mails

in the spring of 1913, and for those railroads which did not have a weighing at that time an increase of not exceeding 5 per cent in compensation was allowed by Congress on account of the parcel post.

On August 15, 1913, and on January 1, 1914, the Postmaster General increased the weight limit to 20 and 50 pounds, respectively, and materially decreased the rates of postage on parcel post, thus encouraging a very large increase in the volume of this traffic, and for this **increased** traffic on the railroads no compensation whatever is provided.

Congress has just passed a bill providing for the expenditures of the Post Office Department for the next fiscal year. That bill is based upon the official estimates of the Post Office Department that during the next fiscal year the parcel post will probably handle about 600,000,000 packages yielding a revenue to the Post Office Department of about \$60,000,000.

Before the establishment of the parcel post the railroads received for their services in transporting the mails approximately one-fifth of the revenues of the Department. Assuming that their service is as great in handling the parcel post — and it is really greater — than in handling other mail, increased revenue of \$60,000,000 to the Department should in all fairness mean increased payments to the railroads of about \$12,000,000 for parcel post alone.

In Great Britain the Government pays the railroads specifically 55 per cent of all receipts from the parcel post for the service the railroads perform in transporting it.

Nevertheless, the appropriation bill passed by the Congress of the United States provides no payment to the railroads for their increased services in handling the parcel post beyond the trivial provision already made.

* * *

CONGRESS INQUIRING.

For over one year past a Joint Committee of the United States Senate and House of Representatives has been investigating the sufficiency of the pay received by the railroad companies for carrying the mails. It is expected that the Committee will soon make its report to Congress.

The main subject of discussion has been an inquiry which was conducted for the month of November, 1909, to find out what it cost the railroads to carry the United States mails. The Post Office Department was required by law to make such an inquiry. The

law was not mandatory upon the railroads. However, the railroads co-operated at an expense to them of about one-quarter of a million dollars, this being about ten times the expenditure of the Post Office Department.

After the preliminary forms were completed in collaboration between the two parties in interest, the Post Office Department elected to proceed with the inquiry alone, notwithstanding the disadvantage it labored under in its unfamiliarity with railroad accounts and statistics and with railroad operating conditions, and notwithstanding the fact that it was an interested party.

Finally, on August 12, 1911, ex-Postmaster General Hitchcock made a report to Congress that on the basis of the share which the United States mail should be debited with the railroads' operating expenses and taxes, with 6 per cent added, the railroads were in 1909-1910 paid \$9,000,000 excess.

The railroads at once pointed out:

1. That this was an ex parte finding.
2. That the Post Office Department had not divided the railroad expenses as between freight and passenger services correctly.
3. That the Post Office Department had not accepted a sufficient amount of car space for the mail service; in fact, the Railway Mail Service could not be operated upon the amount of car space with which the Post Office Department charged themselves.
4. That the proposed allowance of pay merely to cover operating expenses and taxes, plus 6 per cent, would omit all fixed charges and interest on the property investment. In other words, the position of the Department was that the mail service could be performed without regard to cars, or rails, or roadbeds, or terminals, or any other fundamental railroad facilities which represent investment of capital.

* * *

THE RAILROAD LOSS.

The officials of the Post Office Department have endeavored to sustain the position taken by former Postmaster General Hitchcock, and have introduced new issues, such as the allegation that the railroads perform a governmental function in carrying the mails, and should therefore earn less than a commercial rate. The case of the Post Office Department was summed up by the Second Assistant Postmaster General in a statement dated January 16, 1914, addressed to the Congressional Committee above referred to.

On February 26th the railroads, through their Committee on

Railway Mail Pay, submitted the following rejoinder, showing that by using more correct percentages the Department's own figures would show an underpayment to the railroads of about \$29,000,000 per annum.

Calculations have been made on different bases showing loss to the railroads on this business ranging from \$13,000,000 to \$37,000,000, so that the railroads have felt entirely warranted in making the moderate claim that in 1909 the underpay was at least \$15,000,000.

* * *

Since that time there has been a great growth in the mail tonnage; an entirely new business — the parcel post — has been established, and it is therefore evident that a prompt and satisfactory adjustment of this important question is demanded by every consideration of justice and right.

TWO IMPORTANT FACTORS.

1. The correct ratio in the division of railroad operating expenses, and
2. The correct percentage of car space to be charged against the postal service are of supreme consequence in arriving at a correct conclusion as to underpay or overpay from the statistics obtained for November, 1909, for the inquiry, the results of which were imperfectly published in Document No. 105. It is believed that the demonstration offered by the railroads in regard to the proportion of car space chargeable to the postal service is absolutely unassailable.

POST OFFICE DEPARTMENT HANDICAPPED.

It is further believed that no one would seriously contend that the officers of the Post Office Department, even though fully competent to understand and apply the statistics of postal business to postal operations, would from that fact be equally competent to render similar service in the field of railroad statistics and railroad operations, with which they must in the nature of things be entirely unacquainted. Yet, if the officials of the Post Office Department had shown marked and unusual ability in dealing with and applying postal statistics, they would have at least demonstrated qualifications worthy of respect, although even then their unfamiliarity with the railroad field of investigation might prove a fatal handicap.

Our attention has been called to an earnest effort made by the Post Office Department in the year 1911 to explain for the benefit of

the Hughes Commission the proportion of postal expenditures chargeable against second-class mail matter. This Commission, it will be remembered, was appointed by President Taft in response to an Act of Congress, and consisted of the Hon. Chas. E. Hughes, Associate Judge of the Supreme Court of the United States; Mr. A. Lawrence Lowell, President of Harvard University, and Mr. H. A. Wheeler, President of the Association of Commerce of the City of Chicago.

The Hughes Commission in its report of February 2, 1912, under the head of "General Post Office Service," discusses in detail the futile efforts of the Post Office Department to make a satisfactory apportionment of the expenses of the "General Post Office Service." It appears that the original statements submitted by the Department to the Commission were revised again and again to meet the repeated criticisms directed against them, with the final results that the distinguished Commission entirely rejected the great item of "General Post Office Service" expenses amounting to over \$80,000,000 a year, or 40 per cent of the entire postal expenditures at that time, because it could not satisfy itself that the estimates were trustworthy. This incident is not referred to for the purpose of discrediting the enterprise or industry of the postal officials. It is quite likely that, remembering the difficulties of their task, they performed a relatively creditable piece of work, but it may be fairly contended that when they found that their efforts in their own familiar field were not sufficiently convincing to satisfy the Hughes Commission, they would have been justified in entertaining some doubt in regard to the propriety of urging that their estimate of the proper division of railroad expenses should supersede the estimates of experienced railroad officials and railroad accountants.

DEPARTMENT "SURPLUS" BECOMES A "DEFICIT."

It may not be deemed offensive, since it is a matter of public record, to point out that this statistical uncertainty in the Post Office Department extends to postal subjects of more fundamental importance than the assignment of a proportion of expenses to second-class mail matter. Only recently the announcement of one administration regarding a surplus existing at the end of the fiscal year was revised by the succeeding administration, so that a deficit was made to appear for the same year.

We therefore see no good reason for modifying or reducing our claim that the railroads carrying the mails in 1909 were underpaid

at least \$15,000,000, and we note with sincere approval a substantial concurrence in this opinion as expressed after careful investigation by Messrs. Lorenz and Turner in their very able review of the Hearings published in Volume No. 6.

SHALL THE GAUGE OF RAILROAD MAIL PAY BE A STRICTLY COMMERCIAL RATE?

On pages 998-1001 there is allusion to certain advantages which it is claimed that the railroads enjoy in carrying the United States mails from the intrinsic character of the traffic, from the incidental benefits of participating in a national mail service, and from the principle of public utility.

As regards the intrinsic character of the mail traffic, it seems hardly necessary to discuss the "certainty, constancy, and homogeneity of traffic." The testimony submitted to the Joint Congressional Committee abounds in disclosures of the varying quantity of mail presented for shipment, the difference in the volume outbound as compared with inbound, the necessity for providing at all times for maximum conditions, and a failure subjecting the railway carrier to fines. With particular reference to "homogeneity," a great deal might be said to the contrary, even as regards the conditions as existing previous to January 1, 1913, but since that date the parcel post has been established with the widest possible diversity in the character of the traffic, including the bulky, the perishable, and the most fragile character of manufactures and products.

The certainty and regularity of payment is not distinguishable in comparison with the ordinary commercial transactions of the railroads. In fact, the payments are so largely within the discretion of the Postmaster General as to amounts through the "not-exceeding" clause in the law, are so subject to fines and deductions, and subject to so much deliberation and verification before settlement as to be in marked contrast with payments received for passenger and freight business which are practically simultaneous with the transaction.

As regards the protection of mail trains, the principle of public utility and suggestions incident thereto, we quote from the summing up of the Committee on Railway Mail Pay to the Joint Congressional Committee, under date of June 26, 1913, Volume No. 5, page 730:

"Some general ideas advanced from time to time during the hearings call for a few words in conclusion.

"One of these ideas is that the mail service, being a governmental function, ought to be performed for less than what would be a reasonable compensation

for a similar service performed for persons other than the Government. The first observation on this idea is that no such principle is applied to anybody else. Any individual who works for the Government is paid for his services, and in a great many instances he is paid more than he would be paid if he were performing similar service for a private employer. Again, it is a fundamental principle of the Constitutions, both Federal and State, that property shall not be taken for public use without just compensation. If a tract of land is condemned in order to obtain a site for a post office, the owner is entitled to the fair value of the land, notwithstanding the fact that it is to be used to promote the postal service. It is also a well-founded constitutional principle that to take the use of property without just compensation is the same as taking the property itself without just compensation. The Government could not appropriate the entire use of a railway to governmental service without making a fair compensation therefor; and likewise there is no basis for its appropriating a part of the use of a railway to the government service without making a fair compensation therefor. Again, in addition to these controlling constitutional principles, there can be no justifiable political or economic basis for the idea that the people who use the mails shall do so at the expense of the passengers and shippers who use the railways; and in the last analysis any inadequacy in the compensation made to the railways by the Government for the carriage of the mails must be made up by the railways in the charges imposed upon shippers of freight and upon passengers. This observation becomes even more obvious in connection with the recently established parcel post, which is principally used by merchants in the conduct of their ordinary business. Why should the man who ships by freight pay for the transportation service of the other man who ships by parcel post? There may be plausible arguments for a plan of taxing the entire people through the ordinary forms of governmental taxation in order to provide for the transportation by the Government of letters at less than cost; but there can be no pretext for compelling individuals who use transportation in other forms to pay for transportation for letters.

"Another of these ideas is that the railway transportation of mail is a mere incident of by-product, and on that ground not entitled to full compensation. Certainly the passenger service as a whole is not a mere incident or a by-product and as a whole ought to yield, as far as possible, an adequate compensation for the property devoted to that use and for the services performed in that use. Yet there is no part of the passenger service which is of greater importance to the general public than the mail service. There is no part of the passenger service which imposes greater demands upon the railways for speed and certainty of operation of their passenger trains than is imposed by the mail service. Certainly a service which is of such paramount importance to the public, and of such an exacting and costly nature from the standpoint of the railway, cannot in any proper sense be regarded as a mere incident or by-product.

"Another way in which the idea here discussed is sometimes suggested is that if we assume that the railways did not carry the mail, the railway cost would be but little less than it is at present. Such an assumption is utterly inconsistent with the existence of the Post Office Department under present conditions. The railroads could exist without the postal service, but the postal service could not exist, in any modern sense of the term, without the railways. An assumption which is thus inconsistent with the very nature of the Post Office Department ought not to be indulged for the purpose of depriving the railways of a just compensation for carrying the mails.

"The further idea has been advanced that on account of carrying the mails the railways enjoy the power of eminent domain and the protection of the Government in cases of strikes, and that therefore they should carry the mail for less than what should be a full compensation therefor. The same reasons would apply equally to all other carrying functions of the railways. They enjoy the power of eminent domain because they are common carriers of passengers and freight, and they enjoy the protection of the Federal Government because they are instrumentalities of commerce among the States. If these are reasons for their being paid less than full compensation for their services, the reduction of compensation cannot be restricted to the mails. If the power of eminent domain

and the governmental protection operated as an excuse for giving the railways less than just compensation, then there would be no inducement whatever for anybody to invest his capital in the construction and operation of railways.

"The railways owe to the public and to every member of the public the duty to transport all passengers and all commodities seeking their services efficiently and safely and at just and reasonable rates. This is the highest of obligations, and the sum of their obligations to the individual members of the public is their obligation to the Government. They owe no obligation to the State which is separate or apart from, or independent of, or inconsistent with, their obligations to individual applicants for their services. They can have no obligation to the people's government which could require them, except when necessary to the public defense, to discriminate in rates in favor of traffic offered by the Government when, in order to offset such unnecessary discrimination, they would be compelled to collect higher charges from some members of the public and upon other traffic. Words better adapted to the assertion of this principle could not be chosen than those used to express it by the Joint Commission to investigate the postal service which reported in 1901. We quote:

"It seems to the Commission that not only justice and good conscience, but also the efficiency of the postal service and the best interest of the country, demand that the railway mail pay shall be so clearly fair and reasonable that while on the one hand the Government shall receive a full quid pro quo for its expenditures and the public treasury be not subjected to an improper drain upon its funds, yet on the other hand the railway mail service shall bear its due proportion of the expenses incurred by the railroads in the maintenance of their organization and business, as well as in the operation of their mail trains."—(S. Doc. No. 89, 56th Cong., 2d Sess., p. 10.)"

COST OF SERVICE AS A GUIDE IN DETERMINING FAIRNESS OF RATE UNDER COMMERCIAL PRINCIPLE.

To the remarks which are made under this head (page 1005) a very brief response will suffice. It has not been questioned that under suitable circumstances an approximate ascertainment of cost may be arrived at to serve as a useful guide to measure relative efficiency, to regulate expenditures, and to some degree establish approximately the rate below which unmistakable loss would ensue.

The limitations and imperfections of the question in the present stage of the science of railroad statistics are suggested in the following quotations.

The letter from the Committee on Railway Mail Pay, addressed to the Hon. Jonathan Bourne, Jr., Chairman of the Joint Congressional Committee, under date of October 3, 1912, Preliminary Reports, page 8, contains the following:

"The ascertainment of the cost to a railroad of conducting the mail service is necessarily very largely a matter of judgment and opinion, because a large proportion of the total operating expenses are expenses common to the freight and passenger traffic and can only be approximately apportioned, and there are various formulas existing for such apportionment. It would not be right or proper to intrust to the Post Office Department the discretion of selecting the formulas by which to ascertain these costs, because the Post Office Department has an obvious interest at stake, its object always being to reduce the railroad pay to a minimum.

"The estimated cost of a specific service is not a proper basis for fixing rates for transportation of any commodity. The railroads are entitled to receive a

full and fair return for the value of the service performed, and the ascertainment of cost of such service is principally of value as a protection against the establishment of confiscatory rates."

The following quotations from Dr. Lorenz's statement in Hearings, No. 6, page 860, are also pertinent:

"A strong objection is that the cost is to be ascertained separately for each road and made the sole criterion of the rate on that road. Cost is an important guide to what is a reasonable rate, as will be discussed more fully later, but as a matter of principle it would be wrong to pay every road according to cost, because this would be rewarding inefficiency or extravagance and penalizing efficiency."

Page 878:

"While cost may not be capable of that exact ascertainment which enables us to make it the sole determinant factor on which to base the rate of pay for each road, the usefulness of a cost estimate seems clear if used merely as a general guide to help us to decide whether the fifty-odd millions which the railroads receive from the Post Office Department constitutes an excessive payment or not."

Page 892:

"Let it be understood that in view of the undeveloped state of railroad cost accounting, we can hardly consider the cost data submitted as giving a persuasive and definite answer to what is a fair rate. But they tend to support the conclusion to be derived from a study of the average car-mile earnings in passenger trains."

THE CHARGE OF SPACE TO THE MAIL SERVICE.

Under this caption, on pages 1013-1017, there is a discussion of the changes made by the Department in preparing the information contained in Document No. 105 as to the mail space reported by the railroad companies as having been actually operated, and says, on page 1014:

"All arguments, therefore, based upon any assumed concession of the Post Office Department that the unchecked space as reported by the railroad companies for mails were correct must fall."

Throughout the discussion frequent allusions are made to mail-car space operated by the railroad company "for its own convenience" whenever the rules for the acceptance of mail-car space fail to take cognizance of the operating conditions. In other words, the space which the Department considered to be beyond its immediate necessities was necessarily operated in order to supply the space which the Department admitted it needed. For example, if a 60-foot car is needed West bound and the Department believes that it needs only 30 feet Eastbound, it is manifest that the railroad company must return the 60 feet of space Eastbound in order to supply it to the Department for the next trip Westbound. This phase of the matter has been very carefully covered above in the discussion of so-

called "dead space," setting forth the illogical treatment of the subject by the Department in Document No. 105.

On pages 1015-1016 there is a quotation of the Post Office Department rules which were issued for the purpose of tabulating the information as to car space for Document No. 105.

It should be pointed out that in this list of rules there is no recognition whatever of mail-storage cars, although these are a very important part of the postal equipment and constituted over 10 per cent of the car-foot miles tabulated in Document No. 105.

Under the head of "closed-pouch space" (p. 1015) the rule described will be found to allow 50 inches of linear space for 1,000 pounds of mail. Now, a 60-foot car would contain 720 inches, and according to the rule just quoted would carry 14,400 pounds of mail. This is a high average load for a storage car to carry in actual practice, and this means a car in which the entire space is devoted to the mails and the mails are loaded to the full capacity of the car. On the contrary, the closed-pouch service is the retail phase of mail transportation, consisting usually of a few pouches or sacks in the baggage apartment, and is entitled to be measured on the retail principle rather than on the wholesale principle. The Department's rule bore very heavily and unjustly on the short-line railroads, and was probably a strong influence in enabling the Department to reach the conclusion that some of these poorly paid short railroads were really earning over 2,000 per cent profit on their present mail revenue.

Yet, in spite of all this, on page 1016, it is said:

"That for closed-pouch service liberal allowance of space was made."

APARTMENT-CAR SPACE.

On page 1016 this appears:

"That the full amount of space authorized in apartment cars was allowed."

The fact is that apartment-car space is not "authorized" by the Department in the sense that that term is really employed. Inasmuch as the companies are not paid for the space occupied, it would be natural to suppose that they would furnish as little of it to the Department as they could. On the contrary, the demands of the Department for the same reason would tend to exceed its necessities. The fact that the Department's standard plans for mail apartments call for apartments of 6 feet, 8 feet, 10 feet, 12 feet, 15 feet, 20 feet, 25 feet, and 30 feet would require a railroad company to keep a large assortment of different size mail apartments if it undertook to meet

precisely the current needs of the postal service and also the changing sizes required by the increased volume of mail from year to year. It is a simple and inexpensive proceeding for the Department to indicate that it needs a mail apartment 5 feet larger or 5 feet smaller than the railroad company has in stock, especially when it is not required by law to pay for the space or to pay for the alteration. But to the railroad company it means reconstructing the interior of the car, changing the dimensions of the postal furniture and probably the framing of the car to accommodate the changed location of the doors and windows. This entails a considerable outlay, and has created the policy on many roads of providing mail apartments of such length and with such interior facilities as will fully care for the postal business on the maximum day and the heaviest period of the year, with perhaps some consideration of growth in the near future. The Department in its current practice seems to be oblivious of these facts, and instances can be quoted where the railway mail service demands a 12-foot apartment in one direction and a 20-foot apartment in the other on one set of trains and 6 feet in one direction and 10 feet in the other on another set of trains. These are only illustrations of numerous variations of this sort.

Inasmuch as there has never been specific pay for mail apartment-car space, and therefore since the interest of every railroad company would be to provide barely what the postal service absolutely needed, only modified by the unavoidable and controlling operating conditions, it does not seem necessary to argue further that a full allowance for all apartment-car space reported by the railroad should have been made in Document No. 105.

FULL RAILWAY POST OFFICE CARS.

In this case the Post Office Department came nearest to recognizing the actual conditions, but even here, by ignoring the necessity for uniform standards, disallowances of car space were made. On pages 1016-1017 it is said:

"If the company chose for its own convenience to run cars of a greater length than those authorized, certainly the Department should not be charged with the excess space."

A full response to this fallacious doctrine has already been made. In current practice the Department's rules for payment for full R. P. O. cars are at variance with each other. In Document No. 105 the Department undertook in the case of full R. P. O. cars to credit the company with the full space for the round-trip movement according

to the authorization in the heavy direction, but in the actual operation of the service this is not done. By referring to Section 1334, Postal Laws and Regulations, paragraph C, the Department's rule prescribes:

"Where the needs of the postal service require 40 feet of car space for railway post office purposes in one direction, but less than 40 feet in the opposite direction, a line of 40-foot cars may be authorized."

This rule clearly recognizes the justice of paying for the round trip in accordance with the authorization in the heaviest direction. On the contrary, many cases can be cited where a 60-foot authorization in the heavy direction is matched by a 40-foot authorization in the reverse direction.

Another rule of the Department, Section 1334, paragraph F, shows an entire lack of perception of the equities involved. This prescribed:

"Where a line of 60-foot cars is authorized and paid for, and the needs of the service require additional space but do not warrant the authorization of an additional line of 40-foot cars, the railroad company may be required to furnish apartment space."

This would mean that the railroad company must operate an additional car in order to supply the mail-apartment car as a tender to the full R. P. O. car without any additional pay, notwithstanding the fact that the company itself has no use for the space in the extra car not occupied by the mail apartment and would probably be obliged to return this car dead-head in the opposite direction. It is understood that heavy fines have been imposed upon companies which showed a disinclination to submit to this condition.

MAIL STORAGE CARS.

These cars, constituting an important part of the mail-car space reported in Document No. 105, are not mentioned specifically as having been treated in accordance with a precise rule of procedure. It is almost invariably the case that these cars are returned empty in the light direction. A large amount of each space absolutely necessary under operating conditions was disallowed by the Post Office Department, and the impropriety of the Department's action has already been fully described in the discussion of so-called "dead space," but is again alluded to here because of there being no mention of these cars either in the rules quoted by the Department on pages 1015-1016 or in the discussion which is devoted to the subject. However, the Department concludes, on page 1017:

"Notwithstanding this *liberality* of the Department in crediting space, the results obtained by the Post Office Department and those obtained by the Railroad Mail Pay Committee varied considerably, as hereinbefore mentioned."

ANNUAL WEIGHINGS, SIDE AND TERMINAL SERVICE, AND APARTMENT CARS.

ANNUAL WEIGHINGS.

We quote from page 1018, fourth paragraph:

" . . . if the rate fixed on quadrennial weighing is not adequate to compensate for service for the four-year term, there would be merit in the railroads' contention. However, it has been shown hereinbefore that on the basis of Document No. 105 and an additional liberal charge against the mail service for participation in payments of dividends, interest on funded debt, etc., the aggregate annual payment to the railroads in 1910 exceeded the apportioned cost."

As the railroads have plainly demonstrated that they were heavily underpaid for carrying the mails in 1910, it is evident that a more frequent weighing in connection with a constantly growing traffic is a decidedly appropriate method in conjunction with other reforms of remedying the inadequacy.

Dr. Lorenz, in Volume No. 6, page 868, estimates, on figures furnished by the Post Office Department, that an annual weighing would result in additional pay to the railroad companies of \$3,255,000 for the additional work performed, although in this he takes no account of the fact that the ton-mile rate would decline with the increased weight. The law of 1873 required that the mails be weighed not less frequently than every four years and left the discretion of more frequent weighings to the Postmaster General. For many years following the passage of that law it was the practice of the Department to take the weights every four years on the side lines where the mail tons were light and every year or two on the heavy lines where increased growth was more noticeable and burdensome. In recent years, however, the Department has changed the practice and as a rule has taken the weights only every fourth year.

It is a well-known fact that the tonnage increases constantly, and it is merely a business-like proposal to ask that the adjustment of the account be made more frequently than every four years, especially since the introduction of the parcel post.

As a case in point the present Postmaster General has announced officially that he expects the parcel-post traffic next year to amount to 600,000,000 parcels, of which a large proportion will undoubtedly be transported by the railroads. If the conditions were reversed and these parcels were withdrawn from the mails and the Postmaster General failed to order a weighing to protect the interest of the Government, he would certainly be subject to severe criticism.

SIDE AND TERMINAL SERVICE.

On pages 1018-1019 it is argued that the delivery of the mails to and from the post offices by the railroad companies is not a subject for relief, because Document No. 105 has shown that the railroads are already overpaid. The railroad testimony, to the contrary, disposes of this idea.

In addition to this it has been uniformly held by all Commissions, Congressional and otherwise, that have studied the subject of mail transportation that the railroads should be relieved of this service, and many of the Postmasters General and other postal officers have expressed opinions to the same effect. There is a small concession to this opinion on page 1035:

" . . . some changes should be made regarding side and terminal service so as to relieve short lines with small pay, supplying a number of post offices along their route, from expense disproportionate to the revenue received."

APARTMENT CARS.

On pages 1019-1020 the denial of allowance of pay for mail-apartment cars rests on the repeated contention that the railroads were overpaid in 1909. The testimony of the railroads entirely refuting the conclusions of Document No. 105, have, of course, withdrawn all support to this claim.

In the letter of former Postmaster General Hitchcock, of August 12, 1911, transmitting the report that was subsequently printed as Document No. 105, the following is contained:

"No additional compensation is allowed for space for distribution purposes occupying less than 40 feet of the car length. This distinction is a purely arbitrary one and without any logical reason for its existence. It affords a striking example of the unscientific and unbusiness-like methods now followed in adjusting railway mail pay."

Notwithstanding this opinion, the statement on page 1026 throws doubt upon it by suggesting that:

"As a matter of fact there is a reason in the conditions of the service which no doubt led Congress in 1873, when that law was framed, to omit a specific rate for apartment cars, and I believe this fact to be that apartment-car space is invariably furnished the department in a baggage or other car which is run in the train for the railroad's own purposes."

A further study of the subject is convincing that Mr. Hitchcock's remarks are true as relating to the existing conditions of the year 1914 as distinguished from the conditions in 1873 — 41 years ago. The rates prescribed in the law of 1873 were much higher than the now existing rates, and can be said to have made fair provision for mail-apartment car space on the then existing frequency of six round trips a week. The great increase in the frequency of mail-apartment car

service since that time would make the original rates inadequate to-day.

While it may be true in some cases that the mail apartment occupies a portion of a car which the railroad would nevertheless run for its other traffic, there are many cases where the car would not be run at all except to provide the mail apartment for the postal service, which necessarily involves the operation of an additional car in the train.

In regard to the last three items — i. e., “Annual Weighings,” “Side and Terminal Service,” and “Apartment Cars” — the main contention of the Department is that no specific remedial measures are needed because the gross amount of railroad mail pay, according to the conclusions reached in Document No. 105, indicated that the railroads were overpaid. It is hardly necessary to repeat that that conclusion is dependent upon the use of the Post Office Department percentages for division of train expenses and for proportion of mail-car space which have been thoroughly discussed and disposed of.

THE LAW OF MARCH 2, 1907, AND POSTMASTER GENERAL'S ORDER
No. 412 OF JUNE 7, 1907.

It is perhaps unnecessary to make any lengthy response to the remarks under this heading, which appear on pages 1020–1025, except to express the belief, so far as the Act of March 2, 1907, is concerned, that the action of Congress at that time in reducing the rates for mail transportation and for R. P. O. cars was not justified by the then existing conditions, and if an investigation had been held it is not likely that Congress would have taken such action.

The “Divisor” Order of the Postmaster General, under date of June 7, 1907, has already been submitted to judicial review, with the result that the Court of Claims has decided in favor of the railroads. The discussion by the Second Assistant Postmaster General is largely on the mathematical phases of the question, and there is one phrase in italics on page 1023 which is almost as imperfect as any of the mathematical practices described in Document No. 105. This is where, in describing the process of dividing the total weight for the weighing period, which is customarily for 105 days, by the total number of days in the weighing period (105), it is asserted that this would produce an “*exact mathematical average for every day in the year of 365 days.*”

It hardly seems necessary to point out that the only way to obtain such a result would be to weigh the mails for 365 days.

CONCLUSION.

The remainder of the Department's statement deals in a descriptive way with the various plans of adjusting railway mail pay and states its objections to them, and will not be taken up for analytical consideration and criticism. The Committee on Railway Mail Pay having studied this question for several years past in connection with the inquiry of November, 1909, and having had considerable experience in dealing with transportation problems, have been able, in a professional spirit, to appreciate the natural genius exhibited by those who constructed the scale of rates contained in the law of 1873.

It would have been a source of satisfaction to have read a more appreciative and a more extensive description of the basic merits of the law of 1873 than is contained in Volume 7 on pages 1025 and 1026. The law was admirably adapted to the conditions as they existed in 1873, with the exception that the full R. P. O. cars which had then been recently introduced were not accorded an adequate rate of pay. However, this affected relatively only a small percentage of the total amount of pay at that time.

Since 1873 the conditions of service have greatly changed; the volume of tonnage transported has increased enormously, and this has probably been the cause of the successive reductions in the scale of pay by Congressional and Departmental action. On the other hand, the increased frequency in mail-train service and the great development in the distribution of mails en route, with corresponding increase in facilities provided by the railroads, have not been fairly considered in conjunction with the increased tonnage.

Notwithstanding this, the intrinsic merit of the weight scale as set forth in the law of 1873 is by all means the best and most secure foundation for the adjustment of rates both for the Government and for the railroads.

The statement made on page 1034, reading:

"The Railroads' Committee offered no constructive plan aside from proposals for certain changes in existing legislation,"

might be thought to convey the inference that the recommendations of the Committee on Railway Mail Pay were lacking in affirmative proposals through insufficient study of the subject or through disregard of the conclusions arrived at by others who have investigated the subject, some of whom have proposed that **space** rather than **weight** should be the measure of the pay to be allowed.

Any such inference would do serious injustice to the earnest consideration that has been given to this subject by those on the rail-

road side who have had the privilege of studying it. The Committee on Railway Mail Pay selected and recommended those features of amendment which are most important to be dealt with in order to correct the inequalities which have arisen either through successive horizontal reductions in pay or through changes in the conditions of the service.

These recommendations, as submitted on October 3, 1912, in a letter to the Chairman, were as follows:

1. For the repeal of the act of March 2, 1907.
2. For annual weighings and a definite and just method for ascertaining daily average weights.
3. For pay for apartment cars on some basis that will compensate for the service.
4. For a fair allowance to the railroads for side and terminal messenger service which they perform for the Post Office Department according to the value of this service to the Post Office Department.
5. That all rates of pay should be definite and not subject to the discretion of the officers of the Post Office Department.

The Railroad Committee throughout its existence has not failed to give the most thorough consideration to the proposal that space rather than weight be made the measure of the service rendered, but is absolutely convinced by its consideration of the subject that any such plan would be dangerous to the Government and unsatisfactory to the railroads, principally because of the large amount of discretion the adjustment would leave to the officers of the Department.

The growth of the republic has brought about a vast concentration of public business at the national capital, and while it is the expectation that when discretion is allowed under a law it shall be exercised by the chief officer of the Department, it is a physical impossibility for him to personally examine the cases in order to exercise this discretion, and it is likewise physically impossible for this important duty to be performed by the chief officers under his control. The result is that an important question such as this would rest upon the opinions of hundreds of subordinate officials, and the possibilities are uncomfortable to contemplate.

There would be frequent occasions for misunderstanding and irritation. These would lead inevitably toward a lack of co-operation, which should always exist between two national, industrial establishments such as the railroads on the one hand and the postal service on the other.

RALPH PETERS, Chairman.

Committee on Railway Mail Pay Representing 264 Railroads
Carrying Mails on over 218,000 Miles of Line.

COMPARATIVE STATEMENT BASED ON TABLE NO. 7—HOUSE
DOCUMENT NO. 105

COVERING 88.11 PER CENT OF THE TOTAL RAILWAY MAIL PAY FOR 1909-1910.

	Post Office Department	Railroad Companies	An Average of the Two
First Item:			
Total Operating Expenses and Taxes for Month of November, 1909.....	\$137,355,150	\$137,355,150	\$137,355,150
Second Item:	Post Office Department at 29.21 %	Railroad Companies at 34.42 %	An Average of the Two
Passenger Train Expenses and Taxes for Month of November, 1909.....	\$40,121,647	\$47,280,083	\$43,700,865
Third Item:	Post Office Department at 6.68 %	Railroad Companies at 9.32 %	An Average of the Two
Passenger Train Expenses and Taxes chargeable to MAIL SERVICE:			
"a" Month of November, 1909.....	\$2,682,798	\$4,406,503	\$3,544,650
"b" Annual Basis.....	32,193,576	52,878,036	42,535,806
"c" Raised from 88.11 % to 100 % to cover all Mail Routes.....	36,537,936	60,013,660	48,275,798
Fourth Item:	Post Office Department at 1.95 %	Railroad Companies at 3.21 %	An Average of the Two
Net Capital (\$14,000,000,000) covering Roadbed, Rails, Engines, Cars, Stations, Terminals, and other Facilities, chargeable to MAIL SERVICE..	\$273,000,000	\$449,400,000	\$361,200,000
"a" Interest on Net Capital at 6 % chargeable to MAIL SERVICE.....	16,380,000	26,964,000	21,672,000
"b" Interest on Net Capital at 4 % chargeable to MAIL SERVICE.....	10,920,000	17,976,000	14,448,000
RECAPITULATION			
Total Cost chargeable to MAIL SERVICE:			
"a" Operating Expenses and Taxes.....	\$36,537,936	\$60,013,660	\$48,275,798
"a" Interest on Net Capital at 6 %.....	16,380,000	26,964,000	21,672,000
Total.....	\$52,917,936	\$86,977,660	\$69,947,798
"b" Operating Expenses and Taxes.....	\$36,537,936	\$60,013,660	\$48,275,798
"b" Interest on Net Capital at 4 %.....	10,920,000	17,976,000	14,448,000
Total.....	\$47,457,936	\$77,989,660	\$62,723,798
Total Pay:			
Mail Pay—Year 1910.....	\$49,132,644	\$49,132,644	\$49,132,644
Annual Surplus or Deficit*			
"a" Interest at 6 %.....	3,785,292	37,845,016	20,815,154
"b" Interest at 4 %.....	1,674,708	28,857,016	13,591,154

*Deficit in boldface type.

A NATION'S NEGLECT *

BY MARCUS A. DOW

General Safety Agent, New York Central Lines.

In this progressive and enlightened country great strides have been made in the work of conservation of our resources. Much also has been said and done toward the conservation of health and life of the inhabitants, from the compulsory administration of smallpox vaccine to the present discussion in the matter of eugenics and health marriages. But in this progress are we not traveling in a devious route instead of a straight line, circling around problems that are vital and yet simpler to solve than many of the laudable improvements we have undertaken? Are we not, as a Nation, guilty of gross neglect in spite of our progressiveness?

A year ago, at the International Congress of Hygiene and Demography at Washington, there appeared over one of the exhibits a panel reading like this:

INSPECTED HOGS
PROTECTED FORESTS
NEGLECTED CHILDREN

To this might properly be added:

TOLERATED RAILWAY TRESPASSERS

If a dozen persons were killed in a single accident on a railway, the news would be published broadcast throughout the country, the newspapers, under great headlines, printing columns about it. But if a trespasser, either man, woman, or child, walking upon the railway track, is killed to-day, and in a similar accident another trespasser is killed to-morrow, another the third day, and so on until a dozen had met their sudden end in that manner, little or nothing would be said about it and little thought given to it. If a hundred passengers were killed in railway accidents in this country each week, the continued recurrence of such slaughter would be a topic of National concern, the public would be up in arms, widespread investigations and legislative enactments would prevail to put an end to it — yes, even if the weekly toll were one-half or one-quarter of that number. And yet the Nation goes placidly along discussing

* Reprinted from *The Outlook* of September 27, 1913.

eugenics and health laws without number, and hardly a passing thought is given to the 5,284 trespassers killed on our railways in the single year ending June 30, 1912, and the continued killing day after day, year in and year out, that needs only a Nation's attention to eliminate. What a great difference it seems to make whether large numbers of persons are killed together in some train disaster, or are killed separately in many solitary tragedies, caused directly, perhaps, by their own carelessness, but fundamentally and primarily by a great National neglect or public tolerance!

And what is the reason for this lack of attention to a matter that should be regarded as a great National reproach? Is it because the American public ignorantly confuses the word "trespasser" with that of "hobo" or "tramp," shrugs its shoulders, and contents itself with the thought that such a class of persons is of little value to any community or to the welfare of the Nation, and there is no economic loss involved even though thousands of such lives are sacrificed yearly? If that is the reason, let us consider some figures that but few people who are a part of this great American public have ever considered or perhaps even heard of.



FACTORY WORKERS BY THE HUNDRED WALK UPON THE TRACKS
HOMeward BOUND

They walk along absentmindedly or thinking of everything but the fact that their lives are in danger. Manufacturers should educate or caution their employees as to the danger



THE SHORT WAY TO THE BALL GROUNDS

These little victims were shown by their big brothers the shortest way to the ball field. Their parents should have told them that the road which is the longest way around is often the safest

According to a statement made by Interstate Commerce Commissioner C. C. McChord, in an address before the First Co-operative Safety Congress, held at Milwaukee in October, 1912, there were during the last twenty years on the railways of the United States 86,733 trespassers killed and 94,646 injured, or 181,379 trespassers killed and injured during that period.

On one of the great railways of the country an investigation was recently made by one of its officials for the purpose of ascertaining the status of the great body of trespassers killed annually, and the reports of 1,000 cases of fatal injury to trespassers were examined, with the result that it was found that over 75 per cent of them were not "hoboes" or "tramps," but rather were tradesmen, wage-earners, citizens living in the vicinity of where they were killed, and many were women or children of tender years. One railway that has devoted much effort to the reduction of the trespass evil on its line has classified the figures of Commissioner McChord covering twenty years' casualties to railway trespassers as follows:

25,000 young people under eighteen years of age residing in the vicinity of the accident, many of them under ten years of age.

36,276 tramps and hoboes.

120,103 citizens of the locality in which the accident occurred, mostly wage-earners.

These figures are startling, and, while they may not be minutely correct, yet, based as they are upon actual comparisons within stated periods and in certain specified territories, they undoubtedly illustrate with a great degree of accuracy and faithfulness the great economic loss to this country that has been permitted negligently and inexcusably through lack of attention on the part of our educators, legislators, and others who lead in the humane work of conservation of human life in this progressive American republic.

The Interstate Commerce Commission report for the year ending June 30, 1912, shows that during that year on the railways of this country there were 5,284 trespassers killed and 5,687 injured. Think of it! Fourteen trespassers on railways in this country killed every day and an equal number injured. Of those injured the majority were seriously maimed or crippled for life. There were thousands of able-bodied men, whose value to the community, to their families, and to themselves as producing elements, wage-earners, and dependable units in the communities where they live, has been forever impaired, if not lost entirely through death resulting from the injury. There were hundreds of children of tender years sacrificed annually



NOT AN UNCOMMON SIGHT

The coupling of the engine at the other end of these cars would surely mean death or serious injury to one or more of these boys



THE BOYS RUSH BLINDLY ACROSS THE TRACKS

Education in the public schools to teach them, on nearing railway tracks, to stop, look, and listen, is the thing needed for this class of trespassers

on the altar of indifference and inertia. Is it not time that the public woke up and put a stop to this merciless, deplorable, and inexcusable slaughter?

Perhaps the incessant recurrence of these individual tragedies of killed and injured, recorded at the rate of twenty-eight a day, like the doleful hourly striking of the town clock, is due in a measure to the happy-go-lucky recklessness and defiance of the natural law of prudence which is a largely prevalent trait of us Americans. By that same trait men will never learn by the experience of others, but prefer to learn of themselves, in the school of experience, that which no man can teach by years of preaching. But the school of experience for the railway trespasser has proven an expensive method of learning and a deplorably ineffective one, although the price of such learning has been exacted with unfailing precision, and, as the records show, in fifty per cent of the cases it has been the maximum price, a human life, and in the other fifty per cent serious if not permanent injury.

If these five thousand and more persons had been killed on grade crossings, there would have been a widespread campaign for the abolition of those crossings, regardless of expense involved, although

it might run into many times more than a million dollars. Yet in this progressive, humane, and enlightened country, where even an attempted suicide is severely punished by law, the happy-go-lucky, thoughtless, and careless citizens or the immature, untrained children are permitted to go unchecked to their death at the rate of thousands each year.

The deplorable loss of life among those who so foolishly place themselves in danger ought to be a sufficient reason for taking drastic measures to correct the evil; but, if that is not sufficient, let us consider another phase of the matter, and see if we can for a moment put ourselves in the place of one of the thousands of locomotive engineers in whose care the lives of many thousands of passengers are placed daily. An engineer is but a human being. He has feelings, emotions, and a heart like the rest of mankind. His duties require the strictest attention to the signals that control the movement of his train and to the safe operation of the engine and train in his charge. It is highly important that he be a man whose nerves are not unstrung, whose mind is not distracted, whose attention is centered upon the signals, the throttle, and the train order he has to obey. Can you imagine anything more unnerving, more distracting to him,



A GROUP OF TRESPASSERS

The engineer must give attention to signals, switches, and the safe operation of the trains; it is impossible for him to be on the lookout for trespassers continually



PICKING COAL ALONG THE RAILWAY TRACKS

The parents may be in great need of fuel, who send their children on such errands, and they cannot be reached by any law to prevent their negligence. Hundreds have been injured while doing this

than suddenly to come upon a human being or group of human beings directly in his path? Sitting in the Pullman you may hear the shriek of the whistle and feel the grinding of the brakes, as the engineman, responding to his natural human instinct, exerts his utmost to prevent the impact that will surely and swiftly hurl another human being into eternity. But if the trespasser should chance to catch that warning and jump in time, and the engine sweeps by, barely grazing his clothing as it passes, and you feel the brakes release their hold and the train rush forward, resuming its smooth and even course, you will little realize the moment of suspense your engineman has passed through, for you will not see him as he settles back, grinds his teeth, and pulls himself together, thanking his lucky stars that he has averted another killing, but cursing trespassers in general and the conditions that make such a distraction and such an unnecessary strain on his mental and nervous system possible. I once had occasion to get the story of an engineman whose engine had struck and fatally injured a "track-walker," and there were tears in his eyes and his hand trembled as he nervously passed it over his forehead in a gesture of despair and said, "Such things get my nerve — I wouldn't kill a dog if I could

help it, and there is hardly a day when my heart is not in my mouth a dozen times on account of people walking the tracks in the territory through which I run, barely escaping getting caught by me." And so it is not only for the sake of saving the lives of the trespassers themselves that something should be done to stop the practice. There is the added necessity of increasing in every possible way the safety of the traveling public. If trespassing on our railways were reduced to a minimum, it would, to that extent, reduce an element that very often, temporarily at least, must tend to decrease the efficiency of some locomotive engineer by producing a disturbing effect on his mental and nervous system due to an accident, or even a threatened one, in which his engine and a trespasser are involved.

What can be done to put an end to this evil which is growing with alarming and steady strides? Can it be checked, or is it possible to eliminate it entirely or nearly so? Undoubtedly, if handled as a National problem.

In a statement issued by the Special Committee in Relations of Railway Operation to Legislation (composed of the operating heads of several of the large railways); it appears that for the years 1901 to 1910, inclusive, there were 103,452 trespassers killed and injured in



THE RAILWAY TRACKS AS A PUBLIC HIGHWAY

It is the absence of laws and of judicial and public interest that leads the average citizen to use the railway tracks

the United States, while for the same period in Great Britain and Ireland there were but 5,754 trespassers killed and injured. These comparisons may be largely affected by a greater mileage on American railways, but it is nevertheless true that the British railways traverse a more densely populated and congested territory than most of our American railways. But the laws do not permit trespassing upon European railways, and therein lies the greatest factor in considering the comparisons.

There are two things that will be great factors in stamping out the trespass evil in the United States, when that powerful but now sleeping giant, the American **public**, awakens to the seriousness of this problem. These two things are: EDUCATION — LEGISLATION.

The first step should be toward education, and should begin with children in the schools — a careful, systematic, and definite plan of teaching the children Safety. During the years from 1901 to 1910 there were 13,000 children under fourteen years of age killed and injured while trespassing on railways in the United States; as one railway official has aptly put it, enough to make a mile-post for every mile half-way around the world. There were 20,000 between the ages of fourteen and twenty-one killed and injured during the same period, making 33,000 minors who were victims of the neglect of their forebears. Can a more laudable effort be made than the suggested one to educate the children in our schools and teach them from the beginning that to walk upon or play about the railway tracks is unsafe and prohibited? I think not. These lessons should be made of full interest, vividly outlining in the child's mind the danger and the consequences of railway trespassing, so that a lasting impression is left. Although I am speaking particularly of railway trespassing, and do not wish to deviate from my course, I will say that by all means these lessons should go still further and be made a general Safety subject, dealing with the multitude of dangers that beset the child in daily life, dangers which involve street cars, automobiles, etc., but especial attention to railway trespassing should be given, particularly in schools situated near railways or in railway districts. Certainly if the health and general welfare of the child are of sufficient importance to inaugurate systems for the examination and care of the eyes, teeth, lungs, etc., and for the improvement of all physical deficiencies, as is done in the schools throughout the country to-day, it is of equal importance to take progressive steps toward the preservation of the life and limb of that child by systematic and careful training in Safety, or accident prevention. The lessons thus

given will not only work for immediate benefit in reducing the great toll of children needlessly killed and injured, but their effect will surely reach into future years, reducing the accidents to future adults, another generation of wage-earners, whose early school training has taught them the priceless habit of being careful. The lessons in the schools ought to be given at least once each week by a special teacher, and the lessons, which might be of fifteen or twenty minutes' duration, should consist of the reading of interesting stories dealing with the trespass evil and other forms of accidents, each story with a moral; and there should be Safety prizes or badges awarded for the best compositions on Safety, etc. The American Museum of Safety in New York City has done some remarkably good work along these very lines, and has published pamphlets containing stories of child interest that cannot fail to leave a lasting impression upon the childish mind; and under the auspices of the Museum these lessons have been given in the Brooklyn schools with gratifying success. Work along these lines throughout the country, adopted universally in our public schools as a part of the education of the children, will have but one certain effect, that of the permanent betterment of their material welfare.

*Education, as far as adult trespassers are concerned, ought to extend into every manufacturing plant and industrial concern situated near a railway, for it is these plants that furnish by far the largest number of those who violate all rules of wisdom and prudence by walking the railway tracks, as they do on their way to and from work. Much good would be accomplished if the superintendents of such plants in every locality would adopt a plan for the education of their employees. This might be done by posting bulletins in conspicuous places calling the attention of their workmen to the danger of railway trespassing and telling them of the vast number killed and injured, and urging their men not to indulge in the practice of track-walking, or even prohibiting it under the penalty of dismissal. Manufacturers could well afford to make this the subject of special talks or lectures to their employees.

But I have said there are two things necessary to curb the fast-growing trespass evil — **education** and **legislation**. Education properly conducted is an important step in the right direction, but this fearful loss of life and limb can never be successfully checked until we have the intervention of a proper law and law-enforcing powers. It is true that in some States there are statutes making trespassing on railways a misdemeanor and punishable by fine or jail sentence.

But there is no uniformity throughout the States, and experience has shown that in the States where such laws exist it is difficult to obtain convictions even when an arrest of a trespasser is made. Magistrates are prone to discharge the offender and cast a censuring eye upon the railway officer who made the arrest. There seems to be a mistaken idea in the public mind that if a railway company attempts to prosecute such offenders, it is assuming a domineering and contemptible attitude, or exercising unduly the power of wealth over an obscure individual. But why should this be so? What is there to cause a railway corporation or official to assume such an attitude? What reason has a railway for wasting its time and money arresting, prosecuting, and campaigning against such offenders? A man does not damage the railway ties by walking on them. There is no legal redress for the trespasser who is injured, unless willfully. Is it not possible for the public to give the railways the benefit of enough generous thought to say that, after all, it is probably a commendable and humane desire on the part of the railway officials to stop as far as possible a needless and fearful slaughter? But the railways are greatly handicapped. They cannot take any concerted and effective preventive measure because they have no law, and, worse yet, no public or judicial interest to any great extent, back of them giving them the right or authority to exclude, under penalty of the law, these trespassers from their property. It is the very absence of these laws and judicial and public interest that leads the average citizen to believe that railway rights-of-way are public highways, upon which they have a right to be; and the children, following the example of their parents, brothers, uncles, and cousins, gather about the tracks, playing about turntables, in freight yards, hopping on and off cars, and indulging in other dangerous pastimes, with the result that in nearly every city or town there are children crippled or maimed from this cause, and thousands of cemeteries contain the bodies of little ones sacrificed. And all because this great Nation, the most progressive and humane of all people, has not awakened to the seriousness of the problem — because we are the only civilized Nation in the world that has no National law prohibiting, under the penalty of a penitentiary sentence, trespassing on railway tracks, and because in those few States where there are such laws there is a woeful neglect to enforce them. The total number of railway employees and passengers killed on our railways each year is less than the total number of trespassers killed; and if it is worth while for the railways to spend millions of dollars to install and improve safety devices to prevent

the killing of their own employees and passengers, why, I would ask, is it not worth while that some effective legislative action be taken by our Government to protect and save the lives of more than five thousand trespassers annually and the limbs of many thousands more? It would not cost the Nation a penny, and the saving to it of a vast economic loss, not only in the lives of its citizens, but in the reduction in the number of its helpless cripples, would be inestimable.

Not long ago there was one of these unfortunates, a machinist, who had learned his lesson through bitter experience, and who later, when able to hobble about on crutches and the stumps of what remained of his legs, was asked by a railway official why he went on the railway tracks and thus needlessly exposed himself to danger. His reply was, "I have always done it. Of course I knew it was dangerous, but I supposed I could take care of myself. Why, it's the easiest thing in the world to take a short cut down the railway tracks, and the most natural. There's nothing to stop you. If there was a law against it, and I had known I was running the risk of getting arrested and sent to prison, I would have kept off." And that is a typical case. "The easiest thing in the world, and the most natural" to trespass on railway tracks! How well that expresses the situation. Thousands upon thousands of trespassers would tell you the same thing. They think they can take care of themselves, and are willing to run the risk of injury, but would hesitate to run the risk of going to the penitentiary if they knew that that would probably be the result of their recklessness. And you have only to stand on a bridge over the railway tracks in the manufacturing districts of our large cities and watch the industrial workers pour by the hundreds out on to the main line, where trains pass swiftly and with great frequency, and see the workers wend their way homeward along the tracks, some laughing and joking, others earnestly talking with one another, and others with heads bowed down, weary from their day's toil, and thinking of anything, everything, but the fact that they have placed their lives in jeopardy. You have only to go to a railway yard, especially in large cities, and watch the children, from the boy of the reckless, daring age of twelve to fourteen, to the little tots of six years and under, playing about and climbing on cars with reckless abandon, crawling under and between cars liable at any moment to be shunted or moved, or hopping on and off moving cars — doing only what they have been taught by years of example that it is not wrong to do, and adding hourly to the great sacrifice that ought to be the Nation's shame. Yes, indeed, it is easy and natural, because the Government

has not held up its restraining hand and said, "Stop! you must keep off, and you will be arrested and severely punished if you do not."

We have been taught, through science, that choléra, smallpox, and other forms of epidemics are preventable. To run away from these epidemics or ignore them without trying to control and prevent them would be cowardly and the mark of base incompetence. If any people or community were to accept an epidemic of disease as inevitable, a visitation of the wrath of the Creator, or as one of the inexplicable turns of nature, and calmly wait for the community to be destroyed without combating it, they would be looked upon to-day with pity, as ignorant fatalists, incompetent, possessed of the simple mind of heathens, and unable to exert the will of real men in combating evil conditions. Are we, as progressive, humane Americans, to sit idly and allow the annual toll of death and injury to railway trespassers to continue without asserting our will in fighting to prevent it? Are we to display ourselves to the world as incompetent to deal with a condition so grave and yet apparently so simple of solution? Can we go on enacting laws that cast safeguards about birds, fish, and game; can we go on conserving our forests, spending millions for irrigation of lands, devoting brains and money for the successful development of anti-toxins, and actively striving in a thousand ways to lead the world in progressiveness and the uplifting of humanity, and yet remain blind to this vital subject, permit this evil to continue, to grow and go on, **ad infinitum**, and not intervene? We as Americans ought not to, and I think we will not, permit it for long. Let us continue being progressive and humane, but let us move in a straight line and not travel around our great trespass problem, which is, after all, not such a difficult problem, but needs only our National attention, and **education — legislation.**

THE VALUATION OF RAILROADS

BY HON. C. A. PROUTY

Interstate Commerce Commissioner.*

I have been asked to address you upon the valuation which the Interstate Commerce Commission is about making of the property of common carriers subject to its jurisdiction. That work has not sufficiently progressed so that its details could be either intelligently or profitably discussed, but there are certain general phases of the matter which will interest, and should be understood by, the members of your organization. Considered in that broad aspect, the subject naturally divides itself into three heads:

First. The thing to be done.

Second. The time and expense required.

Third. The benefit to be derived.

THE THING TO BE DONE.

The Commission proceeds under a special act of Congress of March 1, 1913. That act, which was evidently drawn after much consideration and with great care, defines in detail the duty of the Commission and should be carefully read by everyone interested in the work. This act embraces the property of all common carriers subject to the jurisdiction of the Commission, but I shall speak to-night of railways alone.

By the terms of the act the Commission is required to ascertain and report the cost of reproducing new the railroad and other property of every railway company in the United States, and the cost of reproduction less depreciation. Evidently, before it can be determined what it would cost to build a particular railroad as it to-day exists, we must know exactly where and what that railroad is. This means that as a preliminary to the work of valuation every railroad must furnish the Commission with maps and plans which will identify its property. Investigation shows that some few railroads in the United States have to-day such maps and plans; many railroads have maps

* Speech of Hon. C. A. Prouty, Interstate Commerce Commission, delivered before the Second Annual Meeting of the Chamber of Commerce of the United States of America, in Washington, February 11.

and plans which contain a part of the information required but not the whole; while many others possess nothing of this sort worth naming. So far as these plans already exist, even though not in the most desirable form, they will be used; in so far as present maps can be added to and extended this may be done, but where no maps exist new ones must be prepared. When this work is completed, there will be found in the office of the Commission at Washington an accurate map and inventory of the property of every railroad engaged in interstate business as of June 30, 1914, together with other maps and plans showing all subsequent additions to the property. This of itself is a work of great magnitude which must be done by the carriers as a part of the general undertaking. You as business men will agree that while some expense will be entailed upon our railroads it will be to them well worth the cost.

When the Commission has been furnished with this complete inventory by a railroad it must proceed to verify it; that is, it must ascertain whether the facts stated in the inventory are true. It must determine the number of yards of earthwork, the number of yards of rock, the culverts, the tunnels, the bridges, together with the character and cost of construction. It has been decided that this information cannot properly be obtained without sending a surveying party over every mile of the railroad. Sometimes the progress of this party can be comparatively rapid; at other times it will be slow; at all times the work must proceed with sufficient care and detail to make certain that the figures obtained are correct. If this valuation is to serve its purpose it must be so made that it will not be open to just criticism. The general public must feel that the work has been properly and thoroughly done, and that the result is reliable. This would not be if any fact which could be accurately ascertained were guessed at.

It will be necessary to note in the course of these surveys and to determine in various other ways the amount of depreciation so that when the work is completed the records of the Commission will show the extent and character of the property of each of our railroads, the cost of rebuilding that railroad as it exists, and the amount of depreciation in the several articles which go into the railroad as well as in the railroad as a whole.

This is mainly an engineering task. The time and expense will be considerable; indeed, herein arises the major part of the outlay, but no serious difficulties are involved, nor should the result when ascertained be in serious doubt. It should be possible for the people of this country to know upon the completion of this work what it would

cost to rebuild its railroads new and to what extent these properties have depreciated as compared to new.

This work is often referred to as a "physical valuation" of railways, and most people probably understand that this cost of reproduction, with or without depreciation, determines the value of the railway so that, having ascertained and reported these facts, the duty of the Commission has been discharged. But this is by no means true. Up to the present time the holding of the Supreme Court of the United States is that cost of reproduction new, or cost of reproduction less depreciation, are only factors entering into the final question of value. Many other things have been enumerated by that court as bearing upon the value of the property. The valuation act itself requires the Commission to ascertain and report the cost of construction, the amount of money which has been invested in the property, and the sources from which that money has been derived; to give, in short, a complete corporate and financial history of these properties; to take note of the earnings of the property, and having all these facts before it to determine from a just consideration what is the value of the property itself. I am not saying that it may not finally come to pass that the cost of reproduction will be the controlling factor; many people so insist. Others urge with equal earnestness that the true test of value, so far as it can be ascertained, is the money invested in the property. I express no opinion upon any of these propositions. I simply call your attention to the fact that the Commission is required not merely to ascertain the cost of reproduction, but to state the value of the property, and that in attempting to do so many delicate and difficult questions may be encountered. Let me instance one or two of these as illustrative.

The first railroad which the Commission is proceeding to survey in what is known as the Pacific District is the San Pedro, Los Angeles & Salt Lake, extending from San Pedro, California, to Salt Lake City, Utah, some eight hundred miles. Most of this road has been built in comparatively recent times, and the circumstances and cost of construction are fairly well known.

The course of the road is for the most part through an arid desert. A certain section of it, when built, was located where no man thought it could ever be disturbed by floods, yet shortly after it was opened for operation the floods came and carried out this portion. It was at once reconstructed upon a new location supposed to be beyond all possible danger from a recurrence of the previous disaster; nevertheless the waters again came and washed away this same section; where-

upon it was rebuilt upon a third location, beyond all possible reach of future trouble from this source.

Considering the nature of the road and the people who were interested in its construction, it seems probable that due caution was exercised in the original location; that is, that a reasonably prudent man building this railroad as those men did, to be operated by them as a railroad, would have located it as it was located. It is undoubtedly true that the second location was made with great care, and was believed to be beyond possible danger. It has cost a large sum more to rebuild this road than it would have originally cost to construct it where it is to-day. Now in determining the value of this property what, if any, allowance is to be made for this experimental outlay? **If the government itself had constructed this railroad it probably would have had the same experience and would have expended the same amount of money which the owners actually did.**

This illustration puts the question in a very striking form, but the same idea enters more or less into the valuation of most of the railroads of this country. There has of necessity been a certain amount of experiment before hitting on the right and proper thing. Does this development expense constitute an element of value which may be recognized to-day, or must the owners of these public utilities stand the loss of their mistakes in the same way that the owner of a private enterprise would? Vast sums of money are involved in the answer to that very simple question.

Take another illustration of a different character. Some years ago in a case pending before the Commission the Northern Pacific Railway Company had occasion to prove the value of its property, and it did so by showing the cost of reproduction. For this purpose it gave the units which entered into that railroad as it then stood. Among other things it showed the amount of land upon which its right of way was located and what it would cost to acquire that land for railroad purposes at that time, claiming that this cost of reproduction was the value of its property.

The Northern Pacific runs through the city of Spokane. When the road was built that city was of small account, but it has come to be of much account, and in the process of development it has grown up on both sides of this railroad. The Northern Pacific claimed, and it may very well have been true, that the cost of acquiring its right of way through the heart of the city of Spokane at the time of the hearing would be at least five million dollars. The original cost to the railroad was nothing, the right of way having been entirely do-

nated either by the government or by private benefaction. Now to whom belongs this five million dollars? Has the Northern Pacific the right to tax the public for a return upon that amount? Whether it has is a thing of great consequence, for nearly one-fourth of the entire value of the Northern Pacific Railway, as shown in that proceeding, was the value of its right of way, much of which was due, as in the city of Spokane, to increase in value over its original cost. This question of the unearned increment presents in the valuation of our railways a difficult problem.

Illustrations like those two might be indefinitely multiplied, but these are sufficient to exhibit the thought I wish to emphasize; namely, that this valuation of our railways is not a mere engineering problem, involving the cost of reproduction or the amount of depreciation alone. Indeed, it is not properly an engineering problem at all but rather a social and economic problem; a legal problem; in its final analysis a political problem. It is for the Commission first of all to ascertain all these facts and from them to deduce what in its opinion is the fair value of these properties. That conclusion may undoubtedly, in some respects and to some extent, be modified by the courts. In the final analysis it will be for the people to say what measure shall be meted out to these railways. While courts and commissions may influence and even temporarily determine questions of this kind, the will of the masses finally prevails, and it is therefore of first importance that the body of the people should have accurate information.

Looking to the work of the Commission alone, and answering the first division of my subject, the thing to be done is this: To marshal every fact obtainable with respect to the present condition and the past history of our railways, and from a just consideration of all these facts to determine the fair value of the properties to-day.

THE TIME AND EXPENSE.

The Valuation Act became a law on March 1, 1913, and the Commission was required by its terms to begin the work within sixty days and to prosecute it with all due diligence. The Commission entered upon this task within the limit specified but up to the present time no substantial progress has been made in the body of the work. While the Commission was permitted by Executive order to employ ten engineers who will have general superintendence of the engineering work, our employees, both engineers and accountants, must be obtained through the Civil Service Commission. Since the Government had never done any work of this character, that Commission

had no rolls from which competent persons could be employed, and although the preparing of such registers was at once begun and has been prosecuted with all possible diligence, it is only within the last few weeks that they have been actually available.

For the purpose of making the surveys to which allusion has been made the country has been divided into five districts, by States, each containing approximately fifty thousand miles of railroad. Each of these districts will have an organization of its own which will conduct the surveys within those particular limits. Subsequently these surveys will be worked out, partly in the district and partly at the head office in Washington. Surveys began in all the districts except one about February 1, and will begin in that district about February 15.

It has seemed to the Commission the part of wisdom to proceed with caution until sure of its ground. In this view a railroad has been selected in each district upon which these surveys will proceed with deliberation and in such manner as to afford a kind of instruction school to all employees. This preliminary work will occupy three or four months, which means that we shall not be in position to rapidly develop our organization until about July 1. Beginning then, or slightly before, our force can be rapidly increased.

While it is somewhat hazardous to make an estimate of the time required without more experience than we have had, **it is my opinion that the field surveys ought to be concluded in from four to six years from July 1st next.** It is hoped that the accounting and other work will keep pace with our field surveys. The putting together of these facts, that is, the actual valuation, will necessarily lag somewhat behind the obtaining of the facts themselves. The Commission will in the near future have all the data with respect to some railroads, but whether a valuation will be at once announced in such cases must depend upon the method which the Commission selects for determining the various questions which will arise and to which reference has been made.

Any estimate of the expense must be even more unreliable than that of the time. Railroads have been valued both by public authority and by themselves, and the cost of these valuations has run all the way from two dollars to seventy-five dollars per mile. I have already said to you that this work, in order to meet its purpose, must be thoroughly done, and this will require a larger outlay upon the part of the Federal Government than has usually been made by the States. Moreover, the work required by this act is much more comprehensive than has ever been undertaken by any State. Knowing what must

be done, the methods which must be followed, the rate of accomplishment which has been attainable in other places, I should say, basing my estimate upon the experience of State commissions, that fifteen dollars per mile would be sufficient to cover the engineering part of the work and ten dollars per mile the accounting and other features. This would aggregate for the entire 250,000 miles between six and seven million dollars.

If the experience of railroads be consulted an entirely different conclusion is reached. The cost, as reported to us, of valuations conducted by the carriers themselves runs from forty to eighty dollars per mile. It is true that in this work by the railways certain things are included which will not be done by the Commission, but to offset this most carriers have ascertained simply the cost of reproduction, with no reference to depreciation, and with but little accounting work. If our information is correct and if the Government cannot do this work cheaper than the railroads themselves, it will cost at least fifty dollars a mile to complete the work. I told the Appropriations Committee of the House last July that from what I knew about the subject then I should not advise Congress to enter upon this undertaking unless it was ready to expend at least twelve millions, and another six months' reflection has not changed that opinion.

While, however, this is a large sum, and much more than Congress contemplated when the act itself was passed, it is the merest trifle compared to the enormous values involved. The capitalization of our railroads at the present time aggregates nearly twenty billions of dollars. It has been recently estimated that these securities at their present market value are worth from fourteen to fifteen billions. The cost of this work, therefore, cannot exceed from one-tenth to one-twentieth of one per cent of the value ascertained, a sum utterly insignificant in proportion to the magnitude of the thing dealt with.

Look at this from another standpoint. One purpose — to some minds the principal purpose — of this valuation is to determine the amount upon which the public should be required to pay a return to the owners of these public utilities. Assume that this valuation varies the amount upon which such return should be paid by only five per cent. Five per cent of twenty billions is one billion, and a return of six per cent upon one billion is sixty millions annually. The difference to either the public or the railroad may therefore well be, for every year, five times the entire cost of the valuation itself. Certainly there is nothing in the expense which should deter the people from

demanding the prosecution and completion of this undertaking in a thorough and competent fashion.

THE BENEFIT.

What, finally, is the purpose of and the benefit to be derived from all this outlay of money and of energy? There are many advantages, some of which I shall refer to without thereby intending to minimize the others. And first let me call your attention to the incidental benefit to the investing public.

Many persons seem to hold the opinion that the Government in dealing with monopolies like the railroad owes nothing to the investing public. *Caveat emptor* — let the buyer take care of himself — such has never been my own thought. The investor is a necessary part of the well-balanced state, and is often in need of protection from public authority. It is the duty of the Government within reasonable limits to see to it that the would-be investor is not hoodwinked in the making of his investment and that the value of his investment, when once made, is not improperly destroyed.

In railway investment the public has a more immediate interest. Just in proportion as railway securities commend themselves to the investing public it is possible for the railway to obtain the money with which to make necessary improvements to its property. Whatever benefits the credit of our railways; whatever gives to railway securities the investment quality with bank stocks and municipal bonds; whatever, in a word, takes from railroad stocks the speculative and uncertain element, indirectly reduces the cost of furnishing railway service and thereby inures to the benefit of the general public.

Now when any investor can know from reliable sources the exact character of his investment; how much it would cost to reproduce the property; in what state of efficiency that property is being maintained; above all, what is the value of that property for use as a railroad, there has been injected into railroad securities an element of certainty and of permanency which does not now exist. It seems to me therefore that this work of valuation will be of incidental benefit to the railway investor and so to the general public. While this has not been generally, perhaps not at all remarked upon as an advantage, it will turn out to be a substantial one.

To the general apprehension the object of this valuation is to determine what rates our railways should be allowed to charge for their services to the public.

While the property invested in our railroads and other public

utilities is private property, the Government has, in consideration of the nature of the service rendered, the right to impose upon this property the terms and conditions under which it shall be used. It may, in the case of a railroad, determine the character of its equipment, the schedules upon which its trains shall run, and in general may control the operation of the property in so far as the public has an interest therein. It may fix the rates to be charged by that railroad for the transportation of persons and of property and for any other service which it renders to the public. To this power of the Government over such private property there is this important qualification: Under the Constitution of the United States as interpreted by the Supreme Court of the United States such property must be allowed a fair return upon the fair value of the investment.

What is a fair rate of return depends, probably, to some extent upon the character of the property and its location. The relative functions of the legislative and judicial branches in the fixing of that rate are not yet clearly defined. All just men concede that it should be substantially the same as the return obtainable from private investment having the same incidents. Manifestly it is not a difficult thing to determine the rate of return to which this property is entitled. There still remains, however, the value upon which this rate is to be computed, and until that value is known it is impossible to determine what total income the property is entitled to earn and, therefore, to fix the charge which may be justly made against the public.

The rates of public utilities are at the present day usually fixed by commissions, both state and federal. It is perhaps the natural inference that when the value of the property has been determined and the rate of return fixed the work of the commission in establishing the charge of the public utility is comparatively easy. It is only necessary to multiply the value by the rate and to allow a charge which will yield that income.

And this, with some important qualifications, is true as to certain kinds of public utilities. Take, for instance, a water plant or a gas plant. This serves a single community. As a rule it meets no competition in that service. The amount of its business is known or can be forecast with reasonable accuracy. Even matters of depreciation and such like have come to be pretty accurately understood. It is possible, therefore, to fix with some confidence the rates of such a utility when the value of the investment is known.

With the railroad, however, this is entirely different for the reason that it seldom happens that a single railroad can be considered by it-

self. The greater part of the business of the railways of the United States is subject to competitive conditions of one sort and another which are largely controlling so that the rates of one are necessarily bound up with those of another. A moment's thought will show the extent to which this is true.

Nearly every station at which considerable quantities of traffic originate or are delivered is served by more than one railroad. It is possible, for example, under present switching absorption tariffs in force at the city of Chicago to reach any point within the switching limits of that city at the same rate by any line which reaches the city. The same is in substance true of the city of New York and the great industrial district of which New York is the center. It is also true that while two given points may each be served by but two railways a great variety of routes between those points can be found by choosing different intermediate carriers. For example, lumber from almost any point of production in the South can reach Chicago by a variety of routes through the various Ohio River gateways. Now while it may occasionally happen that the rate by one route is different from that of another, broadly speaking the rate by competing rail lines is the same. Whatever charge is made by one line between New York and Chicago must be made by all; whatever charge is imposed for hauling lumber to Chicago by one route must be the same by all competing routes.

Nor is direct competition of this kind the only competitive force of controlling influence. An examination of conditions in almost any agricultural State like Iowa, for example, will show that the farm upon which the corn or the wheat is grown lies midway between two lines of railroad so that the product of the same can be sent to market by two, and often by three, different carriers. Manifestly the rate made by each of these carriers for the transportation of this farm produce must be substantially the same. If the farm of Mr. A is five miles from the Northwestern and the same distance from the Rock Island, the rate of transportation under which his wheat and corn and live stock can reach Chicago must be the same by both lines, and the financial necessities of either line are not of the slightest significance. This kind of competition, which is sometimes denominated by railroad men "cross-country competition," powerfully influences and often absolutely controls the rates upon certain commodities which furnish large amounts of traffic.

Still further it often happens that where the service is purely local and can only be rendered by one railroad, still the rate which must be

applied is dictated by competitive conditions. A coal mine may be served by a single carrier, but that carrier cannot therefore impose whatever rate it sees fit upon the product of that mine, for unless the charge to the point of consumption is as favorable as that from some competing mine by some other carrier, the mine itself cannot do business and the railway loses the traffic. This sort of competition is of universal application and of tremendous influence.

Without further pursuing this subject, which of itself is a broad one, it will be seen that the railroads of this country are so bound up together that their rates are largely interdependent. It is impossible to shake a single railroad free from every other and fix its charges upon the basis of a fair return upon its fair value as you would in case of a gas or water plant. The rate established for one of necessity influences and frequently absolutely determines the rate of all, a fact which must never be forgotten in discussing this subject.

Now it is evident that if the Commission should select that road most advantageously situated, that road whose business is the largest and upon which the conditions of operation are the most favorable, and should so adjust its rates as to yield a return of six per cent upon its value, every other railroad standing in competition with it would receive less than a six per cent return and some railroads might receive nothing whatever. The schedules under which one carrier would earn a fair return upon its investment might not even pay the operating expenses of its competitor. Upon the other hand, if that road laboring under the greatest disadvantage were to be selected and such rates established as would permit it to make a return of six per cent upon its investment, its competitors would one and all be receiving an undue return upon their investment.

A certain amount of traffic is strictly non-competitive. What proportion this may bear to the whole I have no idea; the per cent would be small. Theoretically it might be possible for railroads to take up the slack, so to speak, between what would be a fair rate for one and that for another by an adjustment of rates upon this local business. In the Minnesota Rate Case and cognate cases, recently decided by the Supreme Court, it was held that while the principal railroad systems involved had not established confiscation and must therefore submit to the rates prescribed, certain roads of minor importance had made out their case. These lines, in so far as they could, were allowed to charge higher local rates than the others.

The effect of this would be to establish extremely high local charges upon certain lines and extremely low local charges upon others. Upon

main lines and upon lines of dense traffic, rates would be low; upon branch lines and those with less traffic, charges would be high. The general effect would be to concentrate business into certain localities, whereas it has always seemed to me that the aim should be to so adjust transportation charges as to secure a general diffusion of values and of business. If this government operated its railways, rates would be generally the same upon all lines in given sections.

While, however, I wish to make it perfectly plain that the problem of establishing railway rates will not be solved by this valuation, I desire to say with even greater emphasis that that problem will be enormously simplified. It can be known with certainty whether the general level of rates is or is not too high, and in establishing the charges to be observed by a single carrier, even in fixing the rate upon a single commodity, it will be of much benefit to know the value of the property involved. Every railroad commissioner will join with me in saying that here is the only solid foundation upon which he can stand; that the determination of these values is indispensable to the just and intelligent administration of his work.

While this valuation will be of incidental benefit to the investor, while it is essential to the work of the rate-making tribunal, it seems to me that its greatest immediate value is political. The state of the public mind towards our railways is such that this information is absolutely necessary.

Some years ago the Commission had occasion to examine the reasonableness of rates to points upon the Pecos Valley Line of the Santa Fe System. The railroad under consideration runs from Amarillo, Texas, into and through what was then the Territory of New Mexico. That part of the line in Texas had been constructed under a Texas charter, and therefore in conformity with the Texas stock-and-bond law under which the capitalization could not exceed the investment in the property. The railroad in New Mexico had been built under a charter from that territory without any limitation upon the amount of securities which could be issued. The cost of the road was substantially the same in Texas and New Mexico — perhaps slightly greater in New Mexico. The capitalization of the Texas company was \$8,000 per mile; that of the New Mexico company \$42,000 per mile.

This is a somewhat striking instance of what has happened at certain times in certain parts of this country in the building and capitalizing of our railroads. From what is known of such operations there has come to be a deep-seated conviction in the minds of many

people that our railroads as a whole are enormously overcapitalized and that the public is paying interest and dividends upon securities which represent no actual value.

Upon the other hand, it appeared in the Eastern Rate Advance Case, decided in 1910, that the Pennsylvania Railroad had in the ten years preceding that investigation put into its properties east of Pittsburgh more than two hundred million dollars from earnings, which, therefore, was not represented in the capital account of that company. It is well known that many other railroads have improved their property out of earnings without any corresponding increase in their capital accounts. This leads many to the conviction that while individual railroads may be overcapitalized our railroads as a whole are worth more than their stocks and bonds.

Consider the developments of the investigation into the affairs of the St. Louis & San Francisco System, conducted by the Interstate Commerce Commission. Consider conditions in New England today, where the fate both of the Boston & Maine and the New Haven systems is trembling in the balance. None of these questions can be answered; none of these situations can be justly dealt with until we know the actual value of these properties. This is the question which arises before the student of this railway problem at every angle. This is the question which must be answered before this problem can be intelligently discussed. For this reason, above all, it is important that this work should be pressed to a completion in the most expeditious and the most trustworthy manner possible.

ARE AMERICAN RAILROADS OVER-CAPITALIZED?

BY ALBA B. JOHNSON

President of the Baldwin Locomotive Works.*

Nothing is to be gained by issuing a clean bill of health to all roads since the discovery of the steam engine. If we are asked, "Have American railway companies issued stock as a bonus with bonds?" the answer is, "Yes, because it was then necessary to attract investors and was consistent with the business standards of the time; the practice was once general. Moreover, in some consolidations securities were issued to a par value greater than that of the combined issues previously outstanding; also, directors have been known to operate construction companies and to issue stock to buy property from themselves."

Facts are facts, and converts are not to be won by denying them. Charles P. Neill, until recently government mediator in railway labor disputes, says that whenever he found the employer indignant, with reason, and reluctant to arbitrate, he began the acquaintance by acknowledging that it was "an outrage." The belligerent was at once his friend, and inquired, "What do you advise me to do?" "Yield!" said the mediator, and compromise or arbitration followed. A frank admission of what has been done in the past with regard to capitalization, leaving judgment upon it to individual temperament and to Heaven, is the first step toward getting together and seeing what, if anything, should now be done about it.

If, then, as viewed by some, construction companies ought not to have been employed, or employed on other terms, and the stock bonuses ought not to have been given, and the consolidations should have been accomplished, if at all, without increase of capital obligations, how serious have been the results?

Receiverships have wiped out millions of the original capitalization. There were many receiverships and many drastic reorganizations of railroads prior to 1894, but during that year 210 railroads, or twenty per cent of all the railroads in the United States, were in the hands of receivers and their reorganization was later effected by the

* From *The Saturday Evening Post*.

wholesale scaling down of their original capitalization. There are no statistics available to show whether in the aggregate this was equivalent to squeezing out all the water originally contained; but many of the best informed statisticians believe this to have been the case.

Earnings which could have been paid to stockholders, as is the custom in some other countries, have on American roads been put into the property without increase of capitalization. The old rule of the Pennsylvania Railroad Company was a dollar expended for improvements for each dollar disbursed in dividends to stockholders, and for years this practice was emulated by many of the most prosperous and conservative roads. In the twenty years, 1891-1910, the amount expended for terminal improvements and charged to income account aggregated no less than \$459,839,061. The rigid accounting system of the Interstate Commerce Commission was not put into effect until the fiscal year 1908, and in the years before that large sums were expended on the property and charged to operating expenses which now are required to be assigned to capital account.

Stock, again, instead of being given as a bonus "representing nothing but blue sky," has to a large amount been sold for cash above par. The economist, Floyd W. Mundy, cites three cases, the New York Central, Baltimore and Ohio, and Pennsylvania, which, in 1913, he estimates had a total capital stock of \$934,242,088. Of this, \$547,770,653 was issued since 1900, upon which the cash realized was \$620,788,035. Three of our largest roads, he means, got an average of more than eight per cent premium on at least sixty-one per cent of their total stock now outstanding. Among other effects of this policy it has served in the case of these companies to wipe out, many times over, any increases of capitalization through unearned stock dividends.

As a result of these two sets of forces — the sins of the fathers and the penance of the sons — is the burden of interest and dividends sufficiently excessive to require a readjustment of that situation before the matter of reinforcing railway credit and reinvigorating railway progress is undertaken?

Let us seek an answer by sweeping away the cobwebs of par value and per mile of line, which may mean anything or nothing, and applying a test, perhaps rarely used, but a test fundamental, comprehensive and conclusive. Let us ask, Are payments to capital excessive? There happens to be one foreign country, Great Britain, which has a considerable railway system, privately owned and operated, and

yielding statistics comparable with those for the United States. How does our burden of payments to stockholders and bondholders compare with the British? What share of the receipts goes into dividends and interest on funded debt? The figures are as follows:

RAILWAY RECEIPTS AND PAYMENTS TO CAPITAL.

United Kingdom, 1911.

Receipts (returns to British Board of Trade, p. xix)	£127,199,570
Total capital (do, p. xxiv)	1,324,018,361
Average rate interest and dividends (do, p. xxvii)	3.59 per cent.
Amount of interest and dividends (computed from above)	£47,532,259

United States, 1910.

Operating revenue (Interstate Commerce Commission Statistics of Railways, p. 70)	\$2,750,667,435
Net revenue from outside operations (do, p. 70)	2,225,455

Total receipts	\$2,752,892,890
Net interest (do, p. 69)	370,092,222
Net dividends (do, p. 69)	293,836,863

Interest and dividends	\$663,929,085
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Comparison.

Interest and dividends percentage of receipts:

United Kingdom	37.3
United States	24.1

If capital had received from American railways the British proportion of total receipts, 37.3 per cent, instead of 24.1 per cent, as was the fact, the American distribution of interest and dividends in 1910 would have been \$364,772,072 more than it actually was.

Does this test of whether capitalization is or is not excessive afford an overwhelming motive for staying railroad progress in this country, while returns to owners and creditors of our roads are being scaled down?

To many, like the attorney above mentioned who wanted to call Mr. Adams and ask him about a specific road, averages for all the lines of each country compared may not be conclusive. To these, perhaps, one fact in the hand is worth two in the bush. Average statistics is the bush, and the particular instance known to him is the bird in hand. How can we tell but that a considerable number of the principal American lines are carrying too heavy a burden of interest and dividend disbursements? Let us examine for his benefit an Eastern and a Western road which have been most criticized — Alton and Erie. What are the figures? Here they are:

NET DIVIDEND AND INTEREST PERCENTAGE OF RECEIPTS.

United Kingdom (1911)	37.3
United States (1910)	24.1
Alton (1910)	25.8
Erie (1910)	17.3

These figures do not excuse wrongdoing, if wrongdoing there has been, but on the other hand do they furnish reason for blocking American railway leadership as a whole in the development of American industry, commerce, agriculture and territory?

Par value of capitalization should be mentioned, lest the omission be misinterpreted. Par value affords no secure basis of comparison. The usual method is to assign capital per mile of line. This is faulty, because it leaves unanswered the question, What is a mile of line? A mile of line on an average in Texas has only 58.7 per cent as many lines of track as has a mile of line in the statistical group situated in New York, New Jersey, Pennsylvania, Delaware and Maryland, only 23.2 per cent as many locomotives and only 15.7 per cent as many cars. So of terminal cost figures; the per-mile-of-line basis means little unless we know how many miles of line there are per terminal. If two roads have each two terminals, worth \$1,000,000 apiece, and one is 1,000 miles long while the other is but 500, then the 1,000-mile line has capitalization charged to its two terminals of \$2,000,000, or \$2,000 per mile of line, while the 500-mile road has a capitalization charged to its two terminals of \$2,000,000, or \$4,000 per mile of line. Cost of road construction again may be as low as \$20,000 a mile on the prairie and as high as \$250,000 a mile through the mountains, or \$1,000,000 a mile through the city. For this and other reasons comparison of capitalization is unsatisfactory. The facts, however, for what they are worth, are creditable to American railways by such a margin as fairly to raise the question whether any conceivable allowance for difference in conditions would offset it.

The Interstate Commerce Commission, by eliminating duplications, finds as the average net capitalization outstanding in the hands of the public a figure which is given in *Statistics of Railways for 1910*, page 52, as \$62,657 per mile of line. This compares as follows with capitalization in the principal foreign countries, the reduction to terms of American money, in view of the amounts involved, being figured on the precise basis laid down by the United States Bureau of Standards — \$4.8665 to the pound sterling, 19.3 cents to the franc, 23.8 cents to the mark — and reckoning 0.62137 mile to the kilometer:

	Amount.	Excess Over U. S. (Per Ct.)
United States, 1910 (Interstate Commerce Commission Statistics of Railways, p. 52).....	\$62,657	.....
Germany, 1911 (Statistik der Im Betriebe Befindlichen Eisenbahnen Deutschlands, p. 13).....	113,855	81.7
France, 1910 (Statistique des Chemins de Fer Français, pp. 334, 335).....	144,683	130.9
United Kingdom, 1911 (Returns to British Board of Trade, p. xxiv).....	275,156	339.1
England and Wales, 1911 (Returns British Board of Trade, p. xxiv).....	328,415	424.1

These figures, showing an excess over American capitalization ranging from 81.7 per cent in Germany to 424.1 per cent in England and Wales, are averages for all roads. "Net capitalization," on the basis used by the Interstate Commerce Commission for all the roads consolidated in one account, is not easy to compute for individual American roads, owing to the interweaving network of subsidiary corporations. To deduct from the total for the given road the securities of other roads held in its treasury still leaves a sum higher than the "net" actually is, because there would remain to be deducted the securities held in the treasury of every subsidiary, and so on in an all but endless chain. But consider the primary elimination, deducting from the total for the parent corporation only those securities of other companies directly held by it. This shows that there is no American road of considerable size which is not capitalized at less than the British average. Of American roads two hundred or more miles long, that having the highest gross capitalization per mile is the Erie. Its net figure, after making the partial deduction above defined, is \$239,573. The United Kingdom shows an average for all lines 14.9 per cent higher than the Erie; England and Wales 37.1 per cent higher. The Alton net, thus figured, stands at \$129,413. The French average for all roads shows 11.7 per cent higher than the Alton; United Kingdom 112.6 per cent, England and Wales 153.7 per cent higher than the Alton.

Suppose it were the railways of the United States instead of the European lines which showed excess of capitalization per mile of line 81.7, 130.9, 339.1, 424.1 per cent; would not the country visit condemnation upon our roads in good round terms? It is not good form in the United States to applaud railways. I would not suggest the indecorum of Americans throwing up hats over their impressive accomplishment in keeping down the capitalization charges on transportation; but may not one reasonably ask whether "overcapitalization," according to world standards, has really been so flagrant in the

United States as to constitute a national emergency? To meet it, ought the replenishment of equipment and the building of terminals for the accommodation of freight to wait?

Is the question of capitalization, then, as related to actual investment, to be ignored and railway managers left foot-free? The problem is receiving assiduous attention. Railways operating five hundred miles or more of lines which pass through States having statutes for the regulation of railway securities aggregate 198,854 miles, which is 94.6 per cent of the total in the five-hundred-mile class. The Interstate Commerce Commission is at this moment, under mandate of Congress, inquiring into railway capitalization.

Is capitalization, in view of these elaborate and concerted efforts to regulate it, a problem which absolutely must be solved as a condition precedent to revision of freight rates, stiffening of railway credit and provision for handling the expanding business of a great and growing country?

Even when instrumentalities for the regulation of security issues shall have been perfected, how certain is it that capitalization, or the return thereon, has very much to do with freight rates or can be made to have? The Baltimore and Ohio, the Pennsylvania, the Erie and the New York Central operate for the most part under a rate structure, the basis of which is the through rate between New York and Chicago, identical for all four. This rate was fixed in competition but once established it has been accepted as a standard of reasonableness, and rates between points where there is no competition are automatically influenced by that rate through custom and through the long-and-short-haul clause of the Interstate Commerce Act. The whole population served by these roads is, therefore, paying for its transportation at what may be termed the same rates. Assuming that the valuation now under way shall provide a means of judging accurately the cost of the properties, what prospect is there that these roads will prove to be "worth" even approximately the same? One has enormously expensive terminals in Chicago and New York, another not; one passes through many large cities where land is valuable and where elevated, depressed, tunnel and other costly structures have been frequent, another less so; one had to be carried over or under mountains, another traverses mainly a level country. Measuring the actual cost of the roads to the public by the sure test of the percentage of receipts paid to owners and creditors we find that the New York Central distributed in 1910 in net interest on funded debt and in dividends 11.2 per cent of receipts; Erie, 17.3

per cent; Pennsylvania, 13 per cent, and Baltimore and Ohio, 23 per cent. What, in the light of these figures, can capitalization have to do with freight rates?

The Interstate Commerce Commission, as it observed in the Eastern Trunk Line rate advance case, handed down through Commissioner Prouty, "is called upon to deal with rates as they exist, and in so doing we ordinarily consider them, not from the revenue standpoint, but rather from the commercial and traffic standpoint." He went on to declare, discussing the Baltimore and Ohio, Pennsylvania, and New York Central: "Under rates reasonable for these three systems there may be lines whose earnings will be extravagant, but that is their good fortune. There may be lines which cannot make sufficient earnings, but that is their misfortune." The need of the average road was adopted by the Commission as the test. Anxious citizens, who come to see that poverty for their railway means a handicap to those it serves, may inquire what an average road is. They will at least want the door left open for making the rate level adequate for the particular road on which they depend.

Possibly we have been splitting hairs. A new railway question confronts us requiring statesmanship for its solution. When it becomes clear to enough people that the railroads have before them, in enlargement of facilities and provision for safety, a task which must be done, and which cannot be done with money now available, the Interstate Commerce Commission will have before it the demand that this work be accomplished and that conditions be made such that the roads can obtain the capital. No single adjustment for one territory or for one year will suffice. What is required is a permanent policy of protection to railway revenues.

It is to be hoped this may become a national policy. To this end business men may well study the question of capitalization for themselves. Should they perceive that it is largely irrelevant to freight rates let them frankly admit it, they and their representatives in the legislative councils of States and Nations.

THE OHIO FLOODS OF 1913

By LEWIS S. BIGELOW.*

No visitation of spiteful Nature could have demonstrated more vividly the possibilities of disaster always in lurking for the railways of the United States somewhere in the vast territory they serve, than the great floods which swept through the states of Indiana, Ohio, and western Pennsylvania in the spring of 1913. The story of the wholesale destruction of railway roadbed and bridges, of the prompt measures taken to cope with the catastrophe, and of the means and methods adopted to restore the lines of the Pennsylvania Company for traffic, is typical of the American spirit to rise to emergencies.

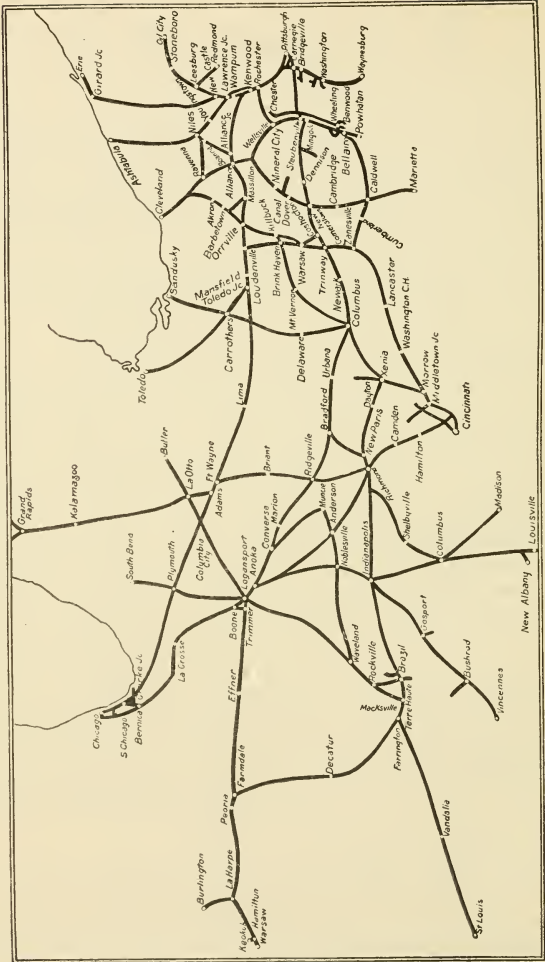
Two skeleton maps have been prepared of the Pennsylvania lines in the flood district before and after the disaster. These are presented on the following pages. Figure 1 shows the network of this company's lines in the third week of March, 1913. Figure 2 shows how the same network was ripped and torn assunder by the floods and incidentally how every other railroad operating in the watershed of the Muskingum, Scioto, and Miami were put out of commission — for the raging rivers played no favorites in the work of havoc.

The watershed of the three rivers named runs northeast and southwest through the northern part of Ohio and drains through their valleys into the Ohio River. Zanesville, Columbus, and Dayton are the three principal cities in these valleys. Each one had the flood of its existence. In Ohio alone there were destroyed 22,000 houses, while 35,000 were seriously damaged by water. A few miles above Zanesville the Muskingum produced a raging lake 51 miles long; and this over the main line of the Pennsylvania System between Pittsburg and Columbus. On the north was found another east-and-west lake of a length of 30 miles — and this covered the main line of the Pennsylvania between Pittsburg and Chicago.

These "lakes" were anything but pacific creatures. They were filled with rushing, boiling currents so powerful that, during the zenith of their existence, no ordinary boats could live in them. They tore out embankments, carried steel-girder bridges long distances, and eroded away the soil of thousands of acres of fertile land, depositing in its place sand and gravel and stones.

* Extracts from statement made for the Pennsylvania Company.

Lines Before the Flood



The Pennsylvania Lines West of Pittsburgh in Commission March 26, 1913

Governor Cox, of Ohio, in the early days of the flood, gave out a statement to the effect that the disaster would prove to be a greater one than the San Francisco earthquake. This was regarded, in some quarters, as one of the wild reports emanating from the flooded district. It has proved more than literally true. It should be borne in mind, too, that there was no insurance against the losses occasioned by the flood. Even after the abolition of temporary relief some 16,000 families required financial relief in order to return to house-keeping.

Generally speaking, there fell on this Ohio watershed, in less than three days, more than three months' normal rainfall. And it came when the ground was thoroughly soaked and every river and stream filled to its limit. The only wonder is that the damage and the loss of life were as small as they were. Governor Cox says that in Ohio alone the population affected numbered a million and a quarter souls, and that the direct money loss was above \$300,000,000.

This was the situation that confronted the Pennsylvania Railroad in the last week of March, 1913. Its lines all through Ohio, running from east to west and from north to south, were literally shot to pieces. Bridges were gone; tracks and embankments swept away — holes in a thousand places; no through line anywhere. Its telegraph and telephone system, too, was a temporary wreck. Passenger and freight cars were marooned, and above 1,250,000 human souls were dependent upon the railway as a means of bringing them the aid and succor they needed in the shape of food, medicines, and the ordinary necessities of life.

The Pennsylvania was not the only railroad that suffered. It would have been much simpler had that been the case. Then one railroad could have helped the other with its men and its tools. The labor market also was as bad as possible. Every city needed every available man for its own work. When the water receded, streets and houses were left covered with a deposit of mud and slime from 6 to 18 inches in depth. Wreckage and filth removal were imperative for life and health.

Rain began to fall in extreme northwestern Ohio, Sunday morning, March 23. In the succeeding four days there was a total precipitation extending over the state ranging from more than 11 inches at Bellefontaine down to 2.7 inches at Marietta, the average for the state being from 7 to 8 inches.

Before the arrival of the main storm, a windstorm, on March 21, struck the western terminals early in the morning, and traveled east-

wardly over the entire lines. The gale blew all day, but as night approached moderated considerably. Poles were blown down, trees were uprooted and hurled against the telegraph lines, breaking them down, or limbs of trees were carried into the line, breaking and crossing the wires; and at a number of places roofs of cars were whisked into the wires. In fifty-five places all the wires in the line were broken and communication totally disrupted for several hours. Where the pole lines were weakened, the wind swaying the poles, caused the wires to swing and cross intermittently, rendering them of practically no value as communication mediums. Sleet, loading and weighing down the wires, added to the trouble. On top of all this came the flood.

The Pennsylvania Company, on its lines west of Pittsburg, has some 3,103 miles of line. This is divided for operating purposes into three systems — the Northwest, the Southwest, and the Central — with, respectively, 1,004 miles, 1,423 miles, and 676 miles. The Southwest system is known as the Panhandle. These systems are subdivided into sixteen divisions.

Every one of the divisions suffered from the flood except the Chicago terminals. In bridges alone there were seventy-four steel structures either entirely destroyed or rendered unsafe for the passage of trains; there were thousands of washouts, ranging from comparatively small breaks to sections of roadbed two miles in length.

On Monday, March 24, while the rains that were to cause the floods were increasing in vehemence, there was no real trouble on the Pennsylvania lines. On Wednesday morning, March 26, the three great systems of the Pennsylvania lines west of Pittsburg were paralyzed — the flood was at its height. Wire and telephone communications were cut to pieces, as well. No such condition of affairs had ever before existed in the railway history of this country. A railroad army of 61,000 men was set back on its haunches, its companies, regiments, and divisions isolated.

A brief summary of just a few of the dispatches received during the early hours of Tuesday, March 25, may give some idea of what was happening to the country covered by this railway system on which there are rather more than twelve hundred stations, both great and small.

On the Pittsburg division, running from Pittsburg to Columbus, Ohio, there were landslides at three different points. This is the main line for the fast 24-hour Limited between New York and St. Louis. It is an old seasoned roadbed in fine condition, and over it could be

safely made as fast time as on any track in the country. There was to be a lake fifty-one miles long stretching over a portion of this division.

The Indianapolis division, which runs from Columbus, Ohio, through Piqua to Indianapolis, reported trouble at seven points: A bridge under water; a bridge washed out; an unsafe bridge; water over tracks; tracks washed out; landslide and bank slipping. A train from this division detouring over the Big Four was wrecked at West Liberty, Ohio, and three trainmen reported killed. A Big Four pilot, who had gone ahead to note the conditions of a bridge, was walking on it when a span went out and the last seen of him he was on this span as it was swept down the river. There was no way in which aid could reach him.

The Richmond division had three landslides and high water. The Cincinnati division had a culvert washed out, water over the tracks, and water up to a bridge. Incidentally, it was reported that it was raining hard. Dayton is on this division.

On the Louisville division, which runs through Indianapolis, the reports from two points read: "Heavy wind; water over tracks; trains cannot move," and "still raining."

From Logansport, dispatches announced that there were six inches of water over the station platform; a concrete bridge was out, and nothing could be moved between Logansport and Chicago. It concluded: "River rising fast; still raining."

On the Eastern division, which runs from Pittsburg to Crestline, and is substantially the eastern half of the main line from Pittsburg to Chicago, in one short stretch between Perrysville and Lucas one bridge was washed out; one other was covered by water, with this additional information: "Don't know whether it is still there;" while a third had sagged three feet in the center, and a fourth was "in bad shape." Tracks to either approach of these four bridge, were badly washed.

Between Mansfield and Toledo all the culverts were weakened and unsafe. There was water over the tracks in the Mansfield yard and in the passenger station. On the Cleveland & Pittsburg division there were landslides, washed tracks, washed track sidings, and stations blocked with rubbish. On the Erie and Ashtabula divisions between Pittsburg, Erie, and Ashtabula there was trouble at fourteen different points.

The Toledo division, which connects Columbus with Toledo and Sandusky, had reports of damage from five centers; three of which

were washouts and the other two water over the tracks. Bay Junction sent the news: "Water over tracks. Cannot get into or out of Sandusky." And Delaware wound up with: "No wires south of Toledo."

Before the flood subsided Delaware was to gain the high-water record. Here the 1913 flood exceeded in depth of water anything previously recorded in that city by 15.7 ft., thus surpassing Zanesville's fifteen feet by seven-tenths of a foot. It was at Delaware that a Big Four bridge was washed out; and so terrific was the force of the



Fig. 4—Pennsylvania Bridge over Muskingum River, Zanesville, Ohio.

current that a 60-ft. steel girder was carried down stream more than two hundred yards, and when the waters subsided it was found on a hillside on high ground, well removed from the bed of the stream. A man was on this bridge when it went out. He was swept into the branches of a tree and managed not only to hang onto them, but to climb a little higher out of the water. There he remained for forty hours, and was eventually rescued after many unsuccessful attempts had been made to get to him.

Strange to say, as has been already remarked, the Zanesville division reported that it was all right. Its turn was quickly coming.

The waters that tore out the bridge between Perrysville and Lucas — the Mohican River — was on its way to join the Muskingum and establish a new flood record in the city of Zanesville, fifteen feet in excess of anything Zanesville had hitherto experienced. The fact that the flood reached Dayton before Zanesville was attacked, accounts for the greater prominence of the former city in the first dispatches.

It is like piling Pelion on Ossa to give in detail the separate messages of destruction which followed one another in quick succession this Tuesday. A small fraction of them may help to an appreciation of what was happening to the country generally — the cities and their inhabitants, the country side and its inhabitants.

The message announcing ten feet of water in the passenger station at Dayton was sent the 25th, but received in Pittsburg at ten minutes after twelve o'clock Wednesday morning the 26th. This was followed, eighteen minutes later by a telegram from Columbus, Ohio: "It is reported that Lewiston reservoir, Logan County, Ohio, has broken, which, if true, will put a tremendous body of water in Great Miami River, affecting Sidney, Piqua, Troy, Dayton, and Hamilton." Lewiston reservoir covers a tract of country five miles long by three miles across. There was yet to be received the telephonic message from Columbus in which the speaker at the Columbus end of the wire said, that while he was telephoning he had seen and counted ten houses slip into the river. He was looking from the windows of a tall building on the side opposite, and in full view of the section flooded.

One may conjure up a picture from this telegram: "At Bridge 141, near Perryville, Eastern division, there is a house lodged against the bridge. Eastern division reports, a few minutes ago, there was another house floating down the stream and right back of it was a covered bridge floating, too, and that Bridge 141 is very liable to go out. It is a 94-ft. deck plate girder bridge, 8 ft. deep." It went.

At 9 a. m. a telephone message from Zanesville reported a 5-in. rainfall, and that the Muskingum River was due at flood stage in twelve hours. The rise came so quickly that the superintendent of the Zanesville division was marooned in his own house for two days.

At 9:36 a. m., from Akron, Ohio, after a list of damage done, including the grounding of wires, the dispatch concluded: "Unable to detour on account of other lines out of business. Water higher than flood of 1898. Still rising and raining." After the flood of 1898, which before this year was a record, the Pennsylvania raised the level of all its tracks and bridges at least one foot above the flood line.

It was then never expected that a flood equal to that one would be seen again in this country.

At Dayton the railroad bridge over the Miami was already unsafe. There was 2 ft. of water in the passenger station there, and a passenger train standing in the station was surrounded by water. The passengers on this train had a very exciting experience. Before the train was stalled there was a great ringing of bells and blowing of whistles all over the city. This was the warning to the people of the coming of the flood — and rumors had it that the city would be engulfed. The streets were filled with excited men and women running hither and thither. The water rose so rapidly about the train that it was necessary to lift the passengers to the roof of the depot porch and thence into the second story of the depot through the windows. More than 190 persons there were, all told, and their only food for two days was such as the depot chef and his assistants could save. From the high tower of the depot, when the flood was at its height, one of the marooned passengers said that the only dry spots in sight were the National Cash Register buildings and grounds and a few other buildings and grounds in that section of the town. All the rest was a waste of water. It boiled past and around the depot, littered with debris. There were many horses in the flood. The only light that night was supplied by burned buildings in the different sections of the city.

At 12:47 p. m. came information that "Our train No. 3 is surrounded by water, with 2,000 ft. of track out behind the train. The Big Four pilot is on the bridge across the stream, but cannot be reached on account of the swift current. One of our brakemen, who was also on the bridge, has disappeared. Big Four trainmaster on the ground, and says he will arrange to feed passengers, but I do not understand how, neither does superintendent of Big Four. In the meantime, we are trying to secure a motor boat to reach passengers."

This was a passenger train from Columbus for Chicago. It left Columbus Monday night, but on account of a damaged bridge it was detoured over the Big Four railway from Urbana. While running over the Big Four its engine went through a bridge at West Liberty and the sleeping car "Eaton" into the Mad River. There were about fifty-five passengers on the train, mostly for Chicago and points farther west. Seven received slight injuries. A physician on the train rendered aid to the injured by means of the first aid boxes. The electric lights held out well and saved a panicky condition. Passengers breakfasted on confiscated express consignments.

The relief train could not get within two miles of the place where the accident took place on account of a bad washout, but sent two doctors, who reached the passengers at 4 a. m. By noontime the women and children had been carried around the break in wagons, while the men had climbed over the undermined tracks. All this was accomplished in a driving rainstorm. The relief train was backed into Urbana, where the passengers were made comfortable.

At 6:15 p. m. there was this telegram from Chicago: "In the absence of anything like definite information from points on the Southwest system, we have arranged for two cars of piling, which is now being loaded, and also for several cars of bridge material, which are also being loaded. We have borrowed a pile-driver from the Western Indiana R. R., together with a full crew for same. We are fitting up two commissary trains, which will be able to leave Chicago late this evening — one of these trains to go with the western Indiana pile-driver. We are getting all the heavy slag we can, and in addition to this we have already started a train of cinders east. We assume, from the meager information we have been able to get, that the most serious damage between here and Columbus is at Piqua, and that Piqua is where the pile-driver, filling, and other material will likely be needed first."

At 6:30 p. m. from the same source came notice of an arrangement with the Pullman Company for ten tourist sleepers for use, if needed at washouts. The telegram concluded, "This is all we can get." The transportation of the United States army to the Mexican line had stripped the territory about Chicago of tourist sleepers.

By 6:48 p. m. news was received that a work train had gone into a creek. "Four Italians and the extra gang foreman were drowned." These, with the death of a foreman killed by the overturing of a pile-driver, were the only serious casualties to workmen in the entire flood period.

At 7:45 p. m. the operator at Morrow telegraphed that he had lost all wires to Cincinnati, and that the water would be in the Morrow office in an hour. At 9:35 p. m. the town of Morrow, southern terminal of the Zanesville division, was under water.

By Wednesday morning, March 26, the battle to bring order out of chaos was on in deadly earnest. The plan of campaign was simple. The first duty of the railroad company was to extend relief to its marooned passengers and to the stricken cities. Then, it must open up to traffic its main lines, and afterward the branch lines.

On this Wednesday, not only was the Pennsylvania Railroad west



Fig. 5—Smith Street Freight Station, Cincinnati, when the Ohio River was at its Highest Stage

of Pittsburg a wreck in the sense that every division was affected, but all other roads in Ohio were in equally bad shape. There was the Erie Railroad, with its double track of main line; the Baltimore & Ohio, likewise; the Wabash, with its single track, and the Pittsburg & Lake Erie, and all their branches. Telephone and telegraph wires were down almost universally. Conditions could not have been much worse. The flood seemed to be in complete control.

No railroad knew or could find out what sections were available for us; but by roundabout methods, by "feeling," for want of a better term, or "smelling," some sort of connection was always possible. A wire would work so far, if only intermittently. This point reached, feelers would be put out, and in the end there would be made some sort of a means of communication. Of course, the different sections of the railroads, with all their possibilities in the way of freedom from flood damage and quick rehabilitation, were known, and with these as a foundation the work of relief began.

"Whatever railroads we have left, crippled though they are, are at your disposal; use them," was the message carried in person by the division superintendents to Governor Cox, of Ohio, and Governor Ralston, of Indiana. They did use them. The railroad's officers were in daily and more than hourly communication with government

officials. Whatever requests were made were acceded to without a word. Cars and trains were hauled, troops and supplies were moved. It was just a matter of hitching on engines and doing it. They loaded the wires with messages locating relief and supply trains, and keeping the officers of the government posted as to the movement and location of these trains. There was no suggestion of commanding railroads. Everything was offered immediately, and absolutely without price. For any relief or government work there was no suggestion of a pecuniary return. The predominant idea was to relieve human suffering and to save human life.

And, when the waters had subsided, the Pennsylvania went to Governor Cox and said that many people with a curious turn of mind, or with worse intentions, might wish to buy railroad tickets to Dayton, Zanesville, and other cities. The company would have no option but to sell this transportation. It was suggested, therefore, that the Governor take into his hands the decision as to whom tickets could be sold, and thus protect the demoralized communities from any additional and unnecessary burdens. This suggestion was immediately acted upon. Nobody could go to Dayton or Zanesville unless the Governor said so.

Logansport and Fort Wayne had asked the Government for life-saving crews. The Pennsylvania, having these stations on its road, and knowing the necessity for prompt action, had two of these crews with their boats and full equipment on a special train, and started for the flooded cities before the government had even asked the Pennsylvania for transportation. These crews arrived in time to do great service.

As early as Tuesday night the "board of strategy" was in session in Pittsburg. From that time until Sunday, April 5th, it was in continuous session day and night. The "board of strategy" was made up of the higher officials of the road and their assistants, with their consulting staff of engineers, motive power, and transportation men.

Everything was done in the name of the general manager. What was going on in the sixteen divisions of the road was reported to this board, and it was thus in absolute control of, and in touch with, the situation. Its information was made possible by the work of the superintendent of telegraph, who had moved his offices next to that of the "board of strategy," and was there carrying on his campaign of wire restoration. For the first 36 hours every one was on duty; after that they averaged 18 hours a day individually.

The three general superintendents of the three systems — the

Northwest, the Central, and the Southwest — established headquarters where they could be in touch with their own divisions and with headquarters at Pittsburg.

The division superintendent has the general superintendent, with his several divisions, to draw upon. And in the event that the matter is of sufficient importance, the general superintendent has the general manager behind him, with control of all the resources of the other general superintendents.

Thus the general manager's office receives the reports, and as soon as there is really widespread and extended trouble he organizes his office forces and divides the work up among his staff officers. He first assembles men and material. In a case such as the present sufficient material is not available, so he must put in orders for this material and place it where it can be used to best advantage. The extra-labor market, too, is affected, because the cities along the damaged lines needed all the labor that they could get for themselves. The other roads were equally hard hit. There could be no assistance from them.

The division officers did not wait for orders. They collected their men and material and hastened to the trouble. It was the extra material that was wanted.

In regular course it falls on the engineering department immediately to prepare a complete list of steel bridges lost or damaged, and to make full and detailed estimates for replacing these structures, together with the plans which the bridge-material makers require when a bridge is ordered. It takes some months to build a steel bridge and therefore long before the temporary repairs are made, all plans for the new work must be completed. This was more than ever necessary in the present crisis, since two whole states were involved in the flood, and many railroads, and because the road which first got in its orders would have its work done first. The broken bridges must be replaced by permanent steel structures before the winter and spring freshets come again. The temporary work will not hold when the ice goes out in the rivers again. The day after the big four-span bridge went out at Tyndall a contract was placed for an entire new bridge of larger dimensions than the one destroyed, and the same day the mills had begun on the order.

The very foundation of protracted repair work is the establishment of a line of commissary. An army travels on its stomach, and it must be well fed and well housed. The men can work the first night or two without sleep, but a long-drawn-out fight requires rest

and relief. The motive power department was called upon to fix up the temporary camp cars for the men. The nucleus of this in time of peace is the wreck train, which, as it must be ready to move any minute, day or night, of course, has always a commissary. The bridge carpenters, too, have a camp car, and these can be enlarged at once by the cooking force available. With these, as a beginning, there was added all the additional commissary necessary to supply the army of workmen.

For the sleeping accommodations old cars were taken, the seats removed and bunks built in. For the dining cars, long tables were set in lengthwise of the cars after the seats had been taken out. Besides, so far as the discarded equipment of the road would supply dining cars and sleepers, they were utilized. The Pennsylvania had many of these, which have gone out of regular service to make way for modern steel ones. Meals were served four times in each 24 hours — at 6 a. m., noon, 6 p. m., and midnight.

Wednesday morning, March 26; the Pennsylvania had some 19 marooned passenger trains in the flooded territory. The officers of the road made it their first business to look after their passengers on these trains. Every train, except the one caught in the Dayton station, was either backed or pulled onto high ground, and the passengers fed and housed either on the trains or, if their locations allowed, were



Fig. 3—Bridge No. 83, Over Kokosing River. Steel Work of Both Spans Gone out. One Pier and One Abutment Destroyed.

taken care of in hotels or private houses. The company paid all the bills.

The passengers passed the time in any way they saw fit; and several men on one train that was held in Bradford — as there was a printing office near by — amused themselves by getting out a newspaper which they called "Pan Handle No. 10," in honor of the official designation of their train.

The Passenger Department in Pittsburg, early this Wednesday morning, sent agents to Altoona to board each incoming passenger train. All passengers for points west of Pittsburg were personally and individually interviewed and offered a choice of the following alternatives:

Their tickets would be immediately redeemed in cash; they might return to their starting points free of charge, and the company would also refund them the money paid for tickets between their starting points and Pittsburg; they could hold their tickets to points farther west and have free transportation home, returning when the railway to the west was opened; or the road would take them as far as it could, and then, if any other line of railway was open, the road would see to it that their tickets were honored on these lines — no matter how roundabout the route. The passengers were not asked for an immediate answer, but were allowed the time between Altoona and Pittsburg — three hours — in which to come to a decision. Generally speaking, those who were on their way home decided to keep on going, while the others took free passage to their starting points.

As early as Monday night at 8 o'clock word was received in Pittsburg of a washout at Mile Post 167, a point eight miles east of Mansfield, Ohio, and on the main line of the Fort Wayne to Chicago. The report stated that the tracks were washed out in a cut for a distance of 60 feet, with an average depth of 20 ft. A wrecking train was started at once from Pittsburg, with the bridge carpenters. This injury to the road was of sufficient importance so that not only the superintendent of the division, but the general superintendent of the Northwest System, left at midnight on a special train. It was raining hard.

There was no delay for the first 115 miles, when the special train ran into water — a foot and a half of it on an average for almost two miles. They got through this all right by running slowly while one of the trainmen walked ahead looking out for floating obstructions. In another ten miles, water was again encountered, and when the train arrived at Wooster it was almost up to the floors of the cars, and so

deep and swift as to make further progress west impossible. Killbuck Creek runs through the Wooster bottoms, and it had covered the country as far as the eye could reach. The roadbed through this section is seven feet above the ground level and no water had ever before got over the tracks. Now, with the embankment as a dam, the water was shooting into the air, making a wonderful spray, so great was its force and so swift was the current. Killbuck water rose all day Tuesday, but began to fall that night. Wednesday morning the pile-driver was put to work as soon as the track was in sight. The pile-driver had headed the procession from Pittsburg. In the meantime, the Tuscarawas River had got going in the rear, and the wreck train and special were thus cut off on both sides of Wooster. All three tracks were out for a mile and a half at Wooster.

Some time on Tuesday night Governor Cox had sent out a call for the National Guard to proceed immediately to Dayton, on account of the great loss of life reported there. One company of the Fourteenth Regiment hailed from Wooster. This company was assembled by the riot call, but when the men were ready to move they found that there was no way for them to get out of Wooster, as all the railroads, county roads, and electric lines, were washed out.

The general superintendent was cut off all Tuesday and Wednesday from wire communication with headquarters. He received word, however, that in addition to the washout first reported, which was still many miles to the west of him, three steel bridges and one stone arch were badly washed at either end for from 40 to 60 ft. in length, and from 10 to 15 ft. in depth; that three steel bridges were completely swept away, leaving chasms 300 ft. in length and 20 ft. in depth; another steel bridge was damaged and two steel arches entirely gone; one about 30 ft. in width, with embankment approaches 20 ft. high, left a hole 600 ft. long and 25 ft. deep.

The bridge forces, 500 men and one pile-driver, had succeeded by Wednesday morning in reaching a point four miles west of Wooster, where the trains were again stalled by water over the tracks. Two telegraph operators were rescued here after a two-day maroonment in their tower. There had been no means before to get assistance to them.

By Thursday this force had left Wooster 18 miles in the rear, when they found the roadbed washed out in two places 800 ft. long and 8 ft. in depth, with the rails and ties entirely swept away. All day was required to build a temporary track on the ground to enable them to reach Loudonville, where they arrived Friday evening, only to find themselves confronted with another 600 ft. break.

In the meantime, other gangs had been organized and were putting the track into safer condition, pending the arrival of material from the east to make the final repairs. Before the general superintendent left Pittsburg he had arranged for complete commissary trains, including a hospital car, a doctor, and all necessities for caring for the sick. Emergency material trains followed in quick succession.

The end of the washouts was only 15 miles west of Loudonville, and between this point and Wooster all the bridges above referred to, were located. Thus the greatest damage was done within a space of 33 miles. The emergency trains carried a complete telegraph and telephone outfit. There was a telegraph repair train, too. By Friday evening there was full telegraph and telephone connection with Pittsburg.

While this work was going on from the east, other pile-drivers and their gangs were working from the west end of the washouts. By noon of Thursday, April 3, they met. There was, at the same time, work going on by half a dozen other organized gangs at different places on the division, each in charge of a responsible engineer. For the first two days every one worked night and day, soaking wet most of the time. After the rain ceased, the thermometer fell below the freezing point.

Heretofore, two days — and that happened only once — was the longest period of time the main line of the Pittsburg, Fort Wayne & Chicago Ry. was ever blocked.

The Central System alone lost nine steel bridges and had four others so damaged that they must be reconstructed. The washouts were so numerous, that it is the literal truth to say, that hundreds of sections of track had to be repaired before any engine or train could pass over them.

At Jeffersonville, Ind., the water on one side of the "Panhandle" fill was 20 ft. higher than on the other or city side. Hard work by the road's employes kept this bank from caving in, or giving way. Tarpaulins were used to prevent the bank from washing and sandbags for filling purposes. More than 17,000 bags of sand and cement were dumped at the weak places. Had the bank given way it meant a depth of water exceeding twelve feet in various parts of the city. The Common Council was so impressed by the work of the road's employes that they passed a resolution thanking the Pennsylvania for saving the city!

The resolution was approved and signed on the 7th of April, 1913. The preamble reads:

"Whereas, The fill of the P. C. C. & St. L. Ry. Co., in Clarksville, Indiana, saved this city from being flooded during the recent high water; and,

"Whereas, The citizens of this city owe the P. C. C. & St. L. Ry. Co., and its officers, a debt of gratitude that it will be impossible to pay because of the building and maintaining of said fill, and preserving the same during the recent flood."

At Cincinnati, the passenger offices were kept open from 7 a. m. to 10 p. m., from March 25th to April 13th. Of course, there were thousands of inquiries there as to what railroad conditions were, not only by the travelers held up there, but by others who wanted to get to various cities as soon as they could rely on means of transportation. The Pennsylvania adopted a novel and effective way of imparting this information at the least convenience to the traveling public. At 6 o'clock every evening, as soon as the officials had learned what the service next day would be, a bulletin was published giving full and correct information without the least regard to securing business. Of these bulletins there were published from 80 to 100, and they were sent to the other railway ticket offices, the hotels, clubs, and newspapers. They came to be regarded — and properly — as the official railway timetable. They saved an immense amount of annoyance and extra labor to the traveling public.

To go into detail of the Pennsylvania losses will hardly furnish an adequate idea of the losses as a whole, but it may be interesting to give a few totals, only suggesting that the problem met would not have been a simple one had the damage been concentrated instead of being widely scattered, and consequently very difficult to get at efficiently.

Number of bridges lost.....	24
Number of bridges damaged.....	50
Number of spans lost.....	39
Number of spans damaged.....	48
Bridges lost — length in feet of road.....	3,597
Bridges lost — length in feet of single track.....	4,318
Bridges damaged — length in feet of road.....	4,189
Bridges damaged — length in feet of single track.....	6,239

The estimated cost of replacing these bridges was \$1,027,116.

Length of trestle built for single track, in miles.....	1.94
Length of track built for double track, in miles.....	0.96
Length of trestle built for three tracks, in miles.....	0.02
Length of trestle built — miles of road.....	2.92
Length of trestle built equivalent to miles single track.....	3.92

The estimated cost of these trestles was \$336,144.

Length of single track road requiring repairs, in miles.....	88.7
Length of double track road requiring repairs, in miles.....	41.1
Length of three-track road requiring repairs, in miles.....	2.5

Length of four-track road requiring repairs, in miles.....	2.8
Length of road requiring repairs, in miles.....	135.1
Length of road requiring repairs, equivalent to miles single track.....	189.6
The estimated cost of these repairs to the road was \$1,396,290.	

In addition to the above, damage to stations and other buildings was \$70,900; to equipment, \$84,285; and to telegraph lines, \$107,505. The direct property loss to the Pennsylvania is estimated at \$3,600,000 in round numbers.

THE NEW HAVEN SITUATION

BY HOWARD ELLIOTT

Chairman of the Board of Directors.*

On June 20, 1913, the Interstate Commerce Commission made public its report entitled "The New England Investigation in the matter of rates, classifications, regulations, and practices of carriers."

In that report there is the following paragraph:

What is needed first of all to improve the railroad situation in New England is rest and an opportunity for constructive work. There is much truth in the claim of these carriers that they have been so occupied with investigations and so criticised by the public that no fair opportunity has been given for the operation of their railroad properties. No railroad management can succeed without the support of the public which it serves. It must never be forgotten that the railroad is a public servant in fact as well as in name, and that the service which it renders depends largely upon the treatment which it receives from its master.

In an effort to conform to the suggestions in the report of the Commission, to improve the general situation, and with the hope and belief that a fair opportunity will be given for the operation of the properties, the directors have taken the following action:

1. A change in the management of the New Haven Company by the selection of Mr. Howard Elliott and Mr. James H. Hustis, who now fill the positions of Chairman of the Board of Directors and President, respectively, coming into the management September 1, 1913.
2. The selection of Mr. John B Kerr, on September 18, 1913, as President of the New York, Ontario and Western Railway Company.
3. The selection of Mr. L. S. Storrs, on December 24, 1913, as President of the Connecticut Trolley Company.
4. The selection of Mr. A. E. Potter, on December 27, 1913, as President of the Rhode Island Trolley Company.
5. The cancellation, on February 1, 1914, of the so-called "traffic agreement" between the New Haven and the New York Central in regard to the Boston and Albany.
6. The withdrawal, on January 24, 1914, by the New Haven Company from the Board of Directors and the management of the Boston and Maine.

*From statement to the stockholders of the New York, New Haven and Hartford Railway Company.

The reorganized managements of these properties with their independent presidents and officers have been perfecting many details of the organization, so as to promote efficiency, safety, and every economy consistent with the reasonable upkeep of the property and to gain the support and confidence of the patrons, the public, and the employees of the road.

PENDING INVESTIGATIONS.

On February 7, 1914, a resolution was passed in the Senate of the United States, as follows:

"RESOLVED, That the Interstate Commerce Commission be requested to make public the facts in its possession concerning the financial transactions of The New York, New Haven and Hartford Railroad Company, and, so far as it may be necessary, to get additional information to thoroughly cover the subject, to reopen its examination of the affairs of that company and to make a further investigation of its financial transactions, with a view to ascertaining:

"First. What became of the funds of said company invested in the various enterprises and corporations mentioned in the opinion of the Interstate Commerce Commission, numbered twenty-three hundred and eighty-four, case numbered forty-eight hundred and forty-five, entitled 'The New England Investigation in the matter of rates, classifications, regulations, and practices of carriers,' submitted May twentieth, nineteen hundred and thirteen, and decided June twentieth, nineteen hundred and thirteen.

"Second. Whether the person or persons authorizing such investment of the funds of said company and the person or persons receiving the benefit thereof are liable to punishment under existing laws.

"Third. Whether under existing law such funds so invested can be recovered on behalf of the stockholders of said company.

"Fourth. What legislation, if any, is necessary to prevent the recurrence of similar transactions."

The company has been investigating some of the subjects under inquiry by the Commission and all information in its possession has been given to the representatives of the Commission with request that they report promptly. As the Commission has these matters in hand the company feels that it should make no public statement until the Commission makes its report.

RULES FOR SAFETY AND RELATIONS WITH EMPLOYEES.

The North Haven accident of September 2, 1913, following, as it did, other serious accidents, made it imperative that the rules and regulations of the company be of such a character as to safeguard to

the greatest extent possible the lives of the public and the employees.

For some time previous to this accident negotiations had been conducted with committees representing the engineers and firemen to revise rules which were not in accordance with modern railroad practice. The new management felt that it owed a duty to the public as well as to the employees to put the new rules into effect at once. The engineers and firemen felt aggrieved at this position of the company and voted to strike. On October 18, 1913, however, the matter was adjusted amicably with the employees, and rules containing the principles for which the management contended remained in effect.

These negotiations, in the judgment of your officers, tended to establish a better understanding and improved relations between the employees and the management, and have assisted materially in restoring confidence throughout the service. Every effort is being made by officers and men to promote a spirit of helpful co-operation, so necessary to maintain and operate the properties efficiently, safely, and economically, and to give good service to the public.

THE IMMEDIATE FINANCIAL SITUATION.

In 1913 the company had a very large floating debt, because of the Massachusetts law prohibiting any funded debt exceeding in amount the paid in capital of the company. This law was changed in July, 1913, so as to permit the issue of bonds to an amount equal to twice the amount of the capital stock.

In order to fund the floating debt under this new law and to provide for the purchase of steel passenger cars and for other improvements the directors in July, 1913, arranged for an issue of six per cent convertible debentures to the amount of \$67,552,000, to be offered to the holders of the stock and the convertible debentures of the company. General financial conditions at that time were not favorable, and in order to make certain that the company would have its money when needed the directors caused this proposed issue of debentures to be underwritten. The stockholders approved this arrangement at a meeting August 22, 1913.

The issue of these debentures though opposed before the Public Service Commission of Massachusetts, was, on October 14, 1913, finally approved by that commission. An appeal was taken from this decision to the Supreme Court of Massachusetts, which, on January 9, 1914, decided that the law of Massachusetts did not permit the issue of debentures convertible into stock.

There were \$40,000,000 of notes to meet on December 1, 1913, and \$5,000,000 of bonds on February 1, 1914. Therefore it became necessary, pending the decision, to borrow on November 18, 1913, these sums and later other amounts to pay for new equipment and for improvements which could not be stopped or postponed. To-day the company must prepare to meet notes maturing prior to July 26, 1914, of nearly \$54,000,000, of which the most important are the 6% notes of November 18, 1913, amounting, with interest and discount on May 18, 1914, to \$46,550,000.

ESTIMATED RESULTS FOR CURRENT FISCAL YEAR.

The general business conditions in New England and particularly on its railroads have been most unsatisfactory, resulting in large decreases in both gross and net earnings. For the eight months ending February 28, 1914, there is a decrease in net income of \$4,735,-478.83, compared with the previous year, after allowing for operating expenses, taxes, interest, rentals, and other fixed charges. Based on the results for two-thirds of the year an estimate has been made for the fiscal year ending June 30, 1914, which indicates that for this period there will be only a small surplus after paying fixed charges.

REASONS FOR DECREASE IN INCOME.

There has been a heavy decrease in earnings due to general business conditions.

There has been an increase in Transportation expenses due to increased rates of pay, to heavy damage claims, and unusual expenditures because of the accidents in 1913, to increasing demands from the public and the public authorities for service and to more severe weather conditions.

An increase in Maintenance of Way expenses due to some increase in rates of pay, to work that should have been done early in the year 1913, and to more work upon improved signals, all of which are necessary for safety.

An increase in Maintenance of Equipment expenses due to increased rates of pay, to a change in the method of charging depreciation (which results in an additional annual charge to operating expenses of \$500,000), to repairs on freight cars purchased in 1906, 1907, and 1908, now requiring heavy work to keep them in suitable condition, and to deferred work on electrical equipment.

A decrease in revenue from Outside Operations due almost entirely to the loss of revenue from parlor and sleeping cars because of the

transfer of this service to the Pullman Company. The contract was made with that company in order to provide immediately steel parlor and sleeping car equipment and to relieve the New Haven Company of a very large investment for such equipment. All parlor and sleeping cars are now of all-steel or steel-underframe construction and practically all coaches in the through New York-Boston trains are of steel.

A decrease in Other Income due to a decrease in or cessation of dividends from the New York, Ontario and Western, from the trolleys, and from the steamships, as these companies are affected adversely by the same causes that affect the New Haven Company; also to a smaller amount of interest on bank balances due to smaller deposits carried by the company.

An increase in Fixed Charges, Rentals, etc., estimated as follows:

Rentals.....	\$387,100	increase
Miscellaneous Taxes.....	10,600	"
Boston Holding Company (on account of no dividends from Boston & Maine).....	615,500	"
New York, Westchester & Boston guarantee.....	86,200	"
Boston and Albany Agreement.....	103,100	"
Interest on Loans (on account of increased amount of short term notes, bearing 6%).....	1,008,600	"
Miscellaneous.....	49,000	decrease
Total increase.....	2,162,100	increase

The increase in rentals is due largely to the constantly increasing investment in the Grand Central passenger terminal at New York. In 1903 the payment made by the New Haven Company for the entrance to New York City and for the use of the passenger terminal was \$1,038,182. For the year ending June 30, 1913, it was \$2,983,969, or about 30c for each passenger. The cost will be more for the year ending June 30, 1914.

INCREASES IN RATES OF PAY.

Reports to the Interstate Commerce Commission for three periods five years apart show as follows:

Year	No. of men employed		Average yearly wages based	
	June 30	Total Compensation	on No. of men employed	June 30
1903	31,028	\$19,659,087		\$633.59
1908	31,735	23,876,652		752.38
1913	34,521	28,151,433		815.49
Increase in number of men employed—1913 over 1903—11%				
" " total compensation —1913 over 1903—43%				
" " average yearly wage —1913 over 1903—29%				

During the fiscal year ending June 30, 1914, the increases in rates of pay will have increased the total pay roll about \$800,000 over the previous year. The greater part of these pay roll increases have been the result of awards under the Federal arbitration acts. If the same rates of pay had been in effect in 1913 as in 1903, the total pay roll for the year would have been approximately \$7,200,000 less.

LEGISLATIVE ACTS AND REQUIREMENTS.

The Federal Nine-hour Law, the Ash-pan Law, the Safety Appliances Law, the Boiler Inspection Law and the Full-crew Law have increased the expenses of the company nearly \$200,000 per year.

The cost of accounting ten years ago was \$190,000 per year. At the present time it is about \$500,000 per year. While the increase in business has had its effect on accounting cost, part of the increase is due to the accounting requirements of the Interstate Commerce and State Commissions.

The recent Federal Act requiring the valuation of railways will increase the expenses of this company about \$60,000 per year for several years.

These facts about increased rates of pay and the requirements by the Government are not referred to in a spirit of criticism, but to show the effect they have on the income of the company.

If, however, the people through their governmental agencies impose these expenses upon the railroads they must provide the money with which to meet them by increasing the rates.

ELECTRIFICATION.

The electrification of the road between New York and New Haven has been very costly, and until the work is completed and full electric service is in operation any possible economies cannot be realized. Any further electrification must be postponed because of lack of capital.

FREIGHT AND PASSENGER RATES.

While the company has had to add constantly to its capital investment and to increase its operating expenses, the freight rates, on the whole, have remained stationary or have decreased. In ten years there has been a reduction of 69/1000 of a cent in the average rate received for hauling two thousand pounds one mile. This very small sum, applied to the freight business of the New Haven road for the year ending June 30th, 1913, would have increased freight earnings \$1,800,000.

The increase in wages and the decline in freight rates alone make a difference of over \$9,000,000 a year in income, equal to six per cent on \$150,000,000 of capital.

The New Haven road is unusual in the relation between its freight and passenger business. Considering the railroads of the country as one system, two tons of freight are carried for each passenger, but on the New Haven only one-third of a ton is carried for each passenger.

During the first eight months of this fiscal year the earnings from passenger trains were 50.6% and the earnings from freight trains 49.4% of the revenue from transportation service. In the same period the average cost (including taxes) of running all trains one mile was \$2.12. The revenue per passenger train mile was \$1.90 and per freight train mile \$4.17. The passenger train mileage is about double the freight train mileage, so that the disadvantage of the New Haven as compared with roads having relatively more freight train mileage is apparent. The passenger train mile revenue is adversely affected by the large proportion of passengers carried on "commutation" and "trip" tickets. These passengers comprise 43% of the total passengers carried, and they yield but 13.6% of the total passenger revenue.

Because of the low passenger fares, both through and local, and because of the increasing costs of the service, much of the passenger train service is operated for the convenience of the public at a loss. Taken as a whole the passenger train service just about pays its operating expenses but does not contribute anything directly to taxes and interest. The fairness of increasing passenger rates, therefore, is obvious.

The average revenue from each passenger carried one mile on the New Haven road is only 1.77 cents and the average payment per passenger is only 32 cents. This low average is due to the large number of passengers carried in suburban territory at rates which range from one-half cent to one cent per mile.

At the same time the expenses of this commutation traffic are particularly heavy on account of the very burdensome cost of the passenger terminals both at New York and Boston. Notwithstanding the extremely low commutation rates the efforts of some of the public authorities have been to reduce them still further. The Public Service Commission of New York ordered substantial reductions in the very low commutation rates between New York suburban points and New York City. The Supreme Court of New York set aside

this order, but the New York Legislature, which has just adjourned, passed an act making the same reductions.

MAIL AND PARCEL POST.

The company is underpaid for the carriage of mail and parcel post. For the carriage of mail and for other services performed by this railroad for the Post Office Department the Government is now paying about \$725,000 per annum. This amount includes \$21,000 for the parcel post. This is 9% less than the payments made for the mail service during the four-year period ending June 30, 1909, when the parcel post was not in operation. A study by chartered accountants made three years ago indicated that \$1,400,000 was approximately the sum to which the company was entitled for carrying the mail. Instead, it was receiving about half that sum, and since then the parcel post has been added with no corresponding increase in pay, on account of which the railroad is receiving at least \$700,000 per year less than it is fairly entitled to for carrying mail and parcel post. In addition, the railroad suffers a further loss in its express earnings because of the effect of the parcel post on the business of the express companies. Express revenues are also adversely affected by the lower rates prescribed by the Interstate Commerce Commission, effective February 1, 1914.

GROUNDS FOR ENCOURAGEMENT.

In considering the estimate of the financial results for the current fiscal year three things must be borne in mind:

First: The estimate is thought to be conservative.

Second: The position of the company with respect to the decrease in net revenue is not peculiar. The New Haven, with all other railroads in eastern territory, has suffered a decline in its revenue with many increases in expenses which are beyond the control of the management. For the seven months' period ending January 31, 1914, compared with the same period one year ago, the loss in net operating income on thirteen of the important lines in eastern territory, and the amount of each dollar of gross earnings absorbed by operating expenses and taxes, are as follows:

Road.	Per Cent of Operating Rev. taken by Operating Expenses and Taxes.		Decrease in Net Operating Income Compared with Same Period last year.	
	1914	1913	Decrease	Per Cent.
N. Y., N. H. & H.....	76.7	70.8	\$3,446,620	26.9
New York Central (Inc. B. & A.).....	80.9	76.5	3,160,002	19.3
Philadelphia & Reading.....	67.1	60.4	2,741,966	22.4
Baltimore & Ohio.....	76.2	72.9	2,227,430	13.9
Erie.....	75.1	68.6	2,222,816	22.3
Pennsylvania.....	78.5	76.5	1,979,615	8.0
Central R. R. of N. J.....	67.3	59.7	1,557,336	22.3
Boston & Maine.....	83.5	80.4	982,276	16.7
Lackawanna.....	66.5	63.8	843,491	9.1
Delaware & Hudson.....	66.7	61.7	749,316	13.7
Boston & Albany.....	79.1	73.8	528,876	19.5
N. Y., O. & W.....	75.6	69.1	436,936	24.6
Long Island	76.5	75.2	374,433	17.5

Third: Prolonged agitation about the company and its management, causing demoralization and loss of efficiency; serious wrecks; falling earnings; increased wages and costs; higher rates for money; work done and investments made for the future with no adequate return at present; demands for more elaborate service and facilities; uncertainty about the relations with the Government; all form a combination of adverse circumstances not likely to be repeated.

GOVERNMENT REGULATION OF RAILWAYS

BY WILLIAM F. HERRIN.

Vice-President and Chief Council of the Southern Pacific Railway Company.*

If, in railway regulation, our aim is to subserve and advance the public welfare, we are aided but little by a too exclusive reliance upon mere legal learning. Our true enlightenment must come from a study of the economic and financial conditions involved. We can thus more clearly discern the public interests affected and more readily understand that these interests are not really antagonistic to those of the railways. On the contrary, these interests are interdependent, and an injury to one works to the disadvantage of the other. In adopting this line of discussion, I assume that the public interest is of first importance and my purpose is to consider how that interest can best be promoted. I am not here to make a special plea for railway interests, but shall attempt, from an independent and impartial standpoint, to arrive at the principles which should govern the proper exercise of this regulative function. Naturally, with the lawyer's habit, I shall cite authorities to sustain my views — not by any means all the authorities which might be cited, for I shall ignore all who have been identified with railway management or service, however able or experienced they may be, and will content myself with citing only those whose study of the subject from an independent standpoint make their conclusions worthy of our serious consideration, and whose record and position in public life leave no critic the opportunity of saying that they are biased in favor of railway interests.

One of the leading members of the Interstate Commerce Commission in point of ability and experience — Hon. Charles A. Prouty — recently said in his address before the National Association of Railway Commissioners that:

The United States is trying an experiment which never has been successfully worked out yet in the history of the world. It is trying to build, develop, and operate its railroads by private capital under rates and regulations fixed, not by the owners of the capital, but by the public.

This authoritative statement challenges our attention. From it we apprehend that the scheme of public regulation of railways in this

*An address delivered before the annual meeting of the California Bar Association on November 20, 1913, at San Diego, California.

country is on trial, and we realize the novelty of this experiment and appreciate its tremendous importance not only to the owners of the billions of private capital involved, but to the public which is vitally interested in these modern highways of transportation. How to balance and harmonize these enormous interests might well perplex the ablest minds. The difficulties of the problem which must be solved no doubt question the wisdom of this experiment, but it would be idle to stop now to discuss whether or not the present scheme of regulation should have been adopted. It will not be abandoned because of difficulties which may arise — it must proceed to its conclusion of success or failure.

But it is profitable, for a moment, to recall the evils which arose in the administration of railways before their public regulation was attempted.

No principle is more vital in railway administration than that there shall be no unjust discrimination between shippers as to service rendered or the rates charged therefor. Unless all shippers pay the same rates for the same service, it would be possible for the favored shipper to cripple or destroy his business rival. There could be no more insidious or vicious practice than to favor one shipper or class of shippers at the expense of others. Such a disturbing force would prevent any sound business development and would be corruptive and destructive in its tendencies. Yet these vicious discriminations were frequent before they were abolished by the force of government regulation. Before such regulation not only was the commercial business of the country prejudicially affected by the giving of rebates or secret rates, but such practice no doubt tended to impair the security of railway investments. At least we know that railroad bankruptcies and receiverships were more frequent in the days of rate cutting than they are now, and while other causes may have contributed to such bankruptcies, yet it is certain that the cutthroat competition between railroads by means of rebates was in some measure responsible for the uncertain conditions of railroad finance. These conditions were intolerable to railroad management, and in justice to railroad managers it must be said that they were the victims of the business practices of the time. The traffic manager could not secure business for his road unless he met the rates given secretly by his competitor. However much he might desire to maintain his published rates and deal fairly with all his patrons, he was forced, in competition with other carriers, to the giving of secret rates. Such practices could not be stopped except by government regulation, for one carrier could

set the pace which all its competitors must follow. Undoubtedly the removal of this one evil of secret rates and rebates fully justified government regulation, and I think no railroad manager would agree to dispense with government regulation at the cost of returning to the old conditions. No one familiar with the history of this subject can doubt that the provisions of the interstate commerce law, enforcing strict compliance with the tariffs filed, have been of great benefit to the railroads, and I think we should not doubt the sincerity of the leading railroad officials when they state that they accept government regulation and are in good faith aiding in the enforcement of the law.

Not only in the enforcement of the tariff rates, but in other important particulars, is the law helpful to railroad interests. For example, in the making of tariffs, especially before government regulation, the carriers were often induced — I might say compelled — to publish rates which unjustly discriminated as between persons or places. Shippers offering large tonnage were frequently able, as the consideration for their patronage, to secure more favorable rates than were given to smaller shippers, and important and influential business centers often, for similar reasons, were able to secure advantages over smaller communities which should not have been given. The action of a commission in removing such discriminations would be accepted by the parties interested, whereas should the railways alone attempt to do this, they would provoke hostility upon the part of those who might have the power of injuring them. In other words, there are many questions which must arise between the railways and their patrons which should be determined by some impartial arbiter, and in all such cases it is for the best interest of the railways that a tribunal should be provided to determine these questions. I have said this much to show that the railways have good reason to accept any rational and fair scheme of regulation administered with reason and impartiality.

How, then, arises the doubt in the mind of Interstate Commerce Commissioner Prouty that the scheme of railway regulation adopted in the United States may not be successful?

He says:

The question is here. Can you obtain under this system (of regulation) the new money which is necessary to develop our old railroad systems and to build our new railroad systems? That is the crucial question.

Upon this point he further says:

When the Interstate Commerce Commission makes an order,

which possibly means \$1,000,000 a year to the carriers affected by it, \$20,000,000 upon a five per cent basis, in one single bite, you cannot help feeling the load of responsibility which goes with the making of the order. . . . It is the duty of the railroad commissioner to most scrupulously protect the railroad and to mete out to the railroad the most exact justice. It is coming to be apprehended that that is required, not merely as a measure of justice to the railway, but as a measure of right in the interest of the public.

The railroad is a public servant. That phrase comes to us from the Supreme Court, and has been for a quarter of a century in the mouth of everybody who has to do with this subject. It comes, as time goes on, to take on a different meaning. Originally the people said, "The railroad is our servant, therefore we can kick the railroad and cuff the railroad *ad libitum*."

It is coming to be understood, gentlemen, that just as your servant can only properly discharge his duties when he is suitably fed, suitably clothed, and suitably housed, so the railroad can only properly discharge its duties when it receives proper treatment from the public. It is coming to be apprehended that in the final analysis the public pays the bill and that it pays for us, as railroad commissioners, to accord to the railroad just and fair treatment. That, I say, is not only demanded by justice — it is demanded by public interest.

It certainly needs no argument to sustain the views thus clearly expressed by one so competent to speak upon this important subject. Mr. Prouty has no bias in favor of railroad interests. He speaks from the standpoint of public interest, and his long and notable record of public service requires us to give serious consideration to his views. He advances no doubtful premises or argument; on the contrary, his statements are obvious and self-evident truths which any fair-minded person must recognize.

No one will question the dependence of this country upon its railways. No other factor has been so important in our national development, and if our country is to advance it must have adequate transportation facilities. Interstate Commerce Commissioner Franklin K. Lane has well said that:

The railroad is our common highroad; it is not a luxury; it is not a concern in which the farmer and the manufacturer alone are interested; it is an essential to the commercial life of our people, almost as necessary as the land itself, for we have grown up as a people to be physically dependent upon our railroads. No other people are so bound up as we in economic interdependence. No one community in all this land lives to itself. We have grown as railroads were built. We have made a community of a continent.

To the same effect I quote from Theodore Roosevelt:

The great need of the hour, from the standpoint of the general public — of the producer, consumer, and shipper alike — is the need for better transportation facilities, for additional tracks, additional terminals, and improvements in the actual handling of the railroads, and all this with the least possible delay. Ample, safe, and rapid transportation facilities are even more necessary than cheap transportation. The prime need is for the investment of money which will provide better terminal facilities, additional tracks, and a greater number of cars and locomotives, while at the same time securing, if possible, better wages and shorter hours for the employees. There must be just and reasonable regulation of rates, but any arbitrary and unthinking movement to cut them down may be equivalent to putting a complete stop to the effort to provide better transportation.

In order to equip our railroads to meet the demands upon them and to keep pace with the development of the country, large amounts of private capital must be provided. Many hundreds of millions of dollars annually are required for this purpose. During recent years the railroads, because of the difficulty of securing the necessary capital, have not been able to make the extensions and improvements requisite to meet extraordinary conditions which have occurred and may occur again at any time, such as a large agricultural crop throughout the country, or traffic movements required in case of war, etc. As a consequence the railways may be said to have fallen behind the country's progress and necessities.

How far new capital is required for the improvement of our railways has been given careful consideration by the Railroad Securities Commission appointed by the President under an Act of Congress, which made its report in November, 1911. President Hadley, of Yale, was chairman of this Commission and his associates were men of high character and ability. The report of this Commission says:

There is a widespread belief, based on imperfect examination of the evidence, that the amount of capital needed for the future development of our railroad system is small in proportion to that which has been required in the past; that the profits on such added investments of capital are reasonably well assured; and that we can therefore fix attention predominantly, if not exclusively, on the needs of the shipper without interfering with the necessary supply of new money from the investors.

It is quite possible that the building of additional railroad mileage will be far less rapid in the future than it has been in the past, but the capital needed for the development and the improvement of the mileage already existing is enormous, even if we built no new mileage at all. The outstanding stock and debt of the railways in the United States averages less than \$60,000 a mile of line. This figure is bound to be greatly increased in the immediate future. As our population

grows denser we shall need more and more to approximate European standards of construction by the increased amount of double track, the abolition of grade crossings, the development of station facilities both for passengers and for freight, and many other improvements scarcely less fundamental. While our railroads are perhaps even better equipped than those of Europe for the economical handling of large masses of long distance freight, they are far from being adequately provided with appliances to secure the convenience of the public or the safety of passengers and employees. The cost of all these things is very great. The average capitalization per mile of railroads in Germany is \$109,000, in France \$137,000, in Belgium \$177,000, in Great Britain \$265,000, and, contrary to the commonly received opinion, much of this excess of cost as compared with American roads is due to other causes than the price of real estate — an item in which our companies have had a great advantage. The cost of European roads has been largely due to improvements which we have not yet made and many of which we must make in the future as population grows denser. The thousands of millions of dollars needed for these purposes must be raised by the sale of securities.

Now, can the railroads, under present conditions, offer securities upon which the needed funds can be obtained?

Upon this point the Railroad Securities Commission say:

Neither the rate of return actually received on the par value of American railroad bonds and stocks to-day, nor the security which can be offered for additional railroad investments in the future, will make it easy to raise the needed amount of capital.

The ratio of interest and dividends to outstanding bonds and stocks of American railroads is not quite four and a half per cent in each case. The average ratio of dividends to the capital of national banks is between ten and eleven per cent. If it be objected that the value of the stocks of our railroads is in considerable measure due to the growth of the community rather than to the cash originally invested, and that the bonds and stocks of railroads should therefore be compared with the combined capital and surplus of the national banks, we find that these banks have for the last three years maintained an average ratio of dividends to capital and surplus combined of over six and a half per cent. If we look not at the sums divided, but at the sums earned, we find the same difference of profit in favor of the banks.

And further this report says:

We hear much about a reasonable return on capital. A reasonable return is one which under honest accounting and responsible management will attract the amount of investors' money needed for the development of our railroad facilities. More than this is an unnecessary public burden. Less than this means a check to railroad construction and to the development of traffic. Where the investment is secure, a

reasonable return is a rate which approximates the rate of interest which prevails in other lines of industry. Where the future is uncertain the investor demands, and is justified in demanding, a chance of added profit to compensate for his risk. We cannot secure the immense amount of capital needed unless we make profits and risks commensurate. If rates are going to be reduced whenever dividends exceed current rates of interest, investors will seek other fields where the hazard is less or the opportunity greater. In no event can we expect railroads to be developed merely to pay their owners such a return as they could have obtained by the purchase of investment securities which do not involve the hazards of construction or the risks of operation.

So we have this problem in a nutshell. The railways cannot compete with other industries in obtaining money for their needs unless their earnings approximate the rate of return gained by such industries. If railway earnings are less than this, capital will seek investment in other securities, leaving the railways without funds needed. The securities offered by railroads must, at least, equal in attractiveness those offered by other industries, or capital will avoid railroad investments.

It is a matter of common knowledge that for the last three or four years it has been very difficult for the railroads to secure upon any reasonable terms the money actually needed by them. I do not ignore the fact that the stringency of the money market affects all other enterprises, including the efforts of states and municipalities to borrow money. But the railways are under special disadvantage in that they cannot raise their rates without the consent of governmental authority while other corporations and individuals free from such regulation may raise their prices and thus secure a return to meet new financial conditions — and state and municipal corporations may, of course, rely upon the practically unrestrained power of taxation to secure necessary funds.

Now, if the present tariff rates were certain to be continued so long as the earnings were necessary to the finances of the railways, it would still be difficult under present conditions for them to secure the money urgently needed for improvements. But the railways cannot deal with this subject upon the assurance that present rates will be continued; on the contrary, rate reductions are being made from time to time by the Interstate Commerce Commission and by state railroad commissions, and applications for increase in rates have generally been unsuccessful, so that the governmental power to fix rates overshadows the situation as a menace which makes it prac-

tically impossible at the present time for the railways to secure any long-time loans, or any loans upon reasonable rates of interest.

I assume that present financial conditions are temporary, and that in the near future we may expect the return to normal conditions; it is in view of such normal conditions that we should consider these questions, and if we assume the most favorable financial conditions, the fact still remains that the Interstate Commerce Commission and the state railroad commissions, with the power vested in them to fix rates, may make it difficult, if not impossible, for the railroads to obtain the money needed. That is to say, if the power of regulation is so exercised as to force reductions, which, if accepted, must result in bankruptcy, the relief which might be given by the courts after tedious and costly litigation would hardly invite the investment of private capital. Even though the capital already invested could be protected against arbitrary reductions, it could not be expected that new capital would be found to run the risk of further litigation, and, as President Roosevelt has said, an arbitrary rate reduction might put a complete stop to the effort to provide better transportation. So we are forced to the conclusion that it rests with the railroad commissions, state and national, to determine how far, if at all, the railroads of this country shall be extended and improved by means of private capital.

In his address, from which I have already quoted, Mr. Prouty, in referring to the fact that practically all railroad building in Canada was aided by government subsidies, said:

We may come to that same idea. We may conclude that railroads ought not to be allowed to charge rates which will induce the building of new railroads by private capital. Perhaps that ought to be the conclusion, but what I say now is that upon the manner in which you gentlemen (the Railroad Commissioners of the different States) deal with this subject of railroad regulation very intimately depends the success with which this experiment is to be worked out and the future of that question in this country of ours.

The **experiment** to which Mr. Prouty refers is, as stated in his own language, the building, development, and operation of the railways of this country "by private capital, under rates and regulations fixed, not by the owners of that capital, but by the public."

Now, what are the difficulties, if any, which stand in the way of the success of this "experiment?" First, let us define this power of regulation and mark its boundaries and limitations.

The Supreme Court of the United States has more than once said

that this "power of regulation is not the power to destroy." There is nothing inherent in the power of regulation which should make it a destructive force. On the contrary, there is no good reason why it should not secure every public interest without impairing the investments which have produced the railways of the country.

Again, in speaking of this power of regulation, the Supreme Court of the United States recently said:

It must be remembered that railroads are the private property of their owners; that while from the public character of the work in which they are engaged the public has the power to prescribe rules for securing faithful and efficient service and equality between shippers and communities, yet in no proper sense is the public a general manager.

f And the court, in the opinion from which I quote, goes on to define the power or function of regulation to be the enforcement of two leading prohibitions against the railways, viz.: (1) "That their charges shall not be unjust or unreasonable," and (2) "that they shall not unjustly discriminate so as to give undue preference or disadvantage to persons or traffic similarly circumstanced."

Now, certainly, the removal or prevention of unjust or unreasonable rates and of unjust discrimination would strengthen rather than weaken the railways, and if the regulative power had been exercised strictly within the definitions of the United States Supreme Court there could be no serious question that the experiment of government regulation would prove successful — that is to say, the railways of this country could be extended, maintained, and operated to their highest efficiency by means of private capital and without financial aid from the government.

Since the era of railway bankruptcies and receivership in the early nineties the commercial and business development of the country has largely increased. For example, comparing the years 1892 and 1912 we find that the freight tons carried one mile increased 202.9 per cent and the passengers carried one mile increased 150.8 per cent. Because of reductions in rates this increased volume of business in 1912 produced only 59.9 per cent more revenue than was earned in 1892.

While owing to the increasing volume of traffic many roads are able to show an increase in gross earnings, the increasing expenses of operation almost uniformly reduce the net earnings. For example, between the years 1907 and 1911 the railways of the United States put into their property over two billion dollars new capital, yet they

received over eight million dollars less net earnings than were received by them in 1907 before this two billions of new capital was invested.

These striking facts explain the decline of railway credit and the practical inability of the railways at the present time to secure the new capital needed by them. It is no exaggeration to say that railway financial conditions are critical. Yet the broad fact remains that the sparsity of traffic which in 1892 contributed to railroad bankruptcies no longer exists. The main lines of road almost without exception now enjoy a volume of traffic sufficient, with reasonable rates, to ensure their successful operation, and this, notwithstanding the largely increased expenses of operation.

We may here naturally inquire how far the expenses of operation have been increased through governmental regulation. This includes legislation, state and national, which has contributed many conditions requiring increased expenses, such as laws regulating the hours of service, safety appliances, separation of grades, full crews, headlights, standards of construction, etc. Then the cost of complying with orders of commissions, state and national, as to keeping of records and statistics and furnishing copies of same, is considerable. The increase in wages has added very greatly to the cost of operation. Congress, by the enactment of what is called the Newland's law, which is a development of the former Erdman act, has provided a method for the arbitration of labor disputes. In order to avoid strikes this law must be invoked, and in so far as the officers of the government participate in the proceedings under this law they must share the responsibility for the resulting increase in wages, if any.

Then we have also the increase in taxation, which, comparing the years 1892 and 1912, is more than 250 per cent. Throughout the United States the railways pay in taxes 4.21 per cent of their gross earnings. In California we are required to pay $4\frac{3}{4}$ per cent.

All these items of expense should be regarded by the railway commissions, state and national, in their decisions as to the reasonableness of rates, and where, through no fault of the railway, expenses of operation have increased, it is difficult to understand why compensatory increases in rates should not be allowed. If such compensatory increases were permitted, no question would arise as to the adequacy of private capital to meet the problems of railroad operation, maintenance, and extension.

By private capital I mean the funds obtained from private investors — which is the source from which all business of the country derives its support. Such funds will naturally seek the investment

or security which promises the highest rate of interest without danger of losing the principal. It follows that the credit of the railways can only be maintained by earnings sufficient to make investments in their securities as attractive as those offered by other business investments.

The rationale of this situation is well stated by the Hon. Franklin K. Lane as follows:

If our commerce is to grow and trade is to be fluent, if we are to continue as a multitude of interdependent communities and individuals, if we are to give the world the benefit of the great resources of this country, and put to its highest use the genius for industrial development which our people manifest, our existing lines of railroad must be made profitable to their owners, and money must find that investment in railroads is both attractive and secure. A regulating body which is not fair to those who have invested their money in a public utility does infinite damage to the community that it is attempting to serve. To be just to the stockholders, however, does not mean that injustice must be done the public. The traffic manager may not ask all that the traffic will bear without doing his railroad in the end a great wrong, nor can the shipper hope to have lasting benefit from any injustice done to those who have put their money at the public service.

Obviously, the experiment of government regulation must prove a failure if it forces down the net income of the railways to such an extent that new capital needed for extensions and improvements cannot be secured. This may be done not only by reducing rates but by imposing conditions which largely increase the expense of operation.

After all unjust discriminations are removed, and the rates are such as do not obstruct the movement of traffic, the first interest of the public is that railway earnings shall be sufficient to give the railways first-class credit in the money markets of the world, for it is only by such credit that adequate transportation facilities, by means of private capital, can be secured.

It is far better for the business of the country that railway earnings should be sufficient to maintain such credit than that any mere reductions in rates should be made which might impair that credit. Concretely stated, it is far more important to the public interest that the money necessary to furnish adequate transportation facilities should be expended by the railways for that purpose than that tariff reductions should be made to the extent of the interest rate upon that money.

The first consideration of the rate-regulating power should be to secure the most efficient transportation facilities for the public, and obviously it should avoid any policy or action tending to cripple the railways or lessen their ability to perform their public service.

When all unjust discriminations are abolished and resulting rates are such that all traffic freely moves between points of production and market destination, such rates are certainly not unreasonable to the public, even though they produce large railway earnings, and if such earnings are actually required as a basis for obtaining the new capital needed for extensions and betterments, why should they not be allowed? Why should there be an effort on the part of the governmental authorities to force these rates down to, or nearly to, the point where the courts would enjoin the reduction because confiscatory? The shipper has no real complaint if he is on an equality with all other shippers and his merchandise readily moves at the higher rate which insures him the most efficient transportation facilities. To bring the rate down nearly to the point of confiscation, and thus prevent the needed extensions and improvements in transportation service required by the shipper, is an actual detriment to the shipper and therefore to the public.

What I have said may not be dismissed as a partisan argument advanced by a railroad official for I am fully sustained by what was said by Judge Prouty in a recent public address and I take the liberty of further quoting from him as follows:

The two original purposes . . . of this (Interstate Commerce) act were, first, to prevent discrimination; second, to make rates reasonable . . .

I think those two purposes of the act to regulate commerce has been in the main accomplished. . . .

What I may term the danger point in the railroad situation has very radically changed in the last 25 years. Twenty-five years ago the danger point was the discrimination. Twenty-five years ago the danger point was the unreasonable rate. To-day, in my opinion, neither of those are danger points. The danger point to-day, I think, is the inadequate service and the inadequate facility.

Now I am speaking to business men. I believe you will agree with me that the service and the facility are of more importance to you than any slight difference in rate. You want your cars. You want reasonable expedition. You want everything which goes with an efficient service, and that you must have. . . .

I think that to-day it is just as much the duty of the commission to see that the railroads are given reasonable rates which will yield to them a fair return as it is to see that no unreasonable rate is charged

to the shipper, and I believe this is in the highest interest of the shipper himself. . . .

When you reduce the rates of the railroads of the country to a point where they no longer yield a profit, you have destroyed the value of their property, you have annihilated their credit, and you have made it absolutely impossible for the railroads to provide the service which you must have.

I ought, as a member of the Interstate Commerce Commission, in passing upon the reasonableness of a rate, to bear in mind the fact that that property has been dedicated to the public use upon the theory that it is to enjoy a fair return. But if I were to lay out of view entirely the interest of the railroad, if I were to consider your interest, and your interest alone, it would be my duty, and my highest duty to you, to allow the railroad a sufficient rate so that it might from that rate obtain the needed revenue with which to develop, with which to maintain its credit, with which to give you the service which you must have, and which you cannot otherwise enjoy. . . .

In the past, as a rule, the orders of the Commission have been in reduction of rates rather than in permitting their advance. . . . But this is a time of change, and no man can forecast the future. The cost of living is advancing. The cost of almost everything which a railroad buys is increasing. Wages which they must pay are increasing. . . . So I say to you, gentlemen, that no man can foretell whether in the years to come it will be, or will not be, necessary to allow some increase in the transportation charges of our railroads.

In what Judge Prouty has thus said I believe he represents the spirit and thought which actuates his colleagues as well as the railroad commissions of the different states in the discharge of their official duties, and from this I argue that the railroads need not fear injustice which at the same time would cause a greater injustice to the best interests of the whole country.

We cannot doubt that when these considerations are generally understood, as they are coming to be and will be, the public interest in these matters will receive protection at the hands of the railway commissions of the country. I do not think it possible that the railway commissions will deliberately or purposely embarrass the railways to prevent them from obtaining the private capital required for their needs; in other words, to make the experiment of government regulation a failure in order to bring about government ownership of the railways. **I do not believe that government regulation will be made a failure because of the deliberate purpose of railway commissions to make it so.** All that is needed is a thorough understanding of the situation, not only by the railway commissions but by the railway officials themselves, and it is the clear duty of the latter to aid in every reasonable way the railway commissions in their work. As I

have said, the railway officials have good reason to accept this regulative function on the part of the government, but this function involves many difficult and complex questions which can only be solved rightly and for the best interests of all by the thorough co-operation of railway officials with the railway commissions.

The office of a railroad commissioner is one of high responsibility. I believe no other office in our government is more important. It requires great ability and no one can be well qualified for this position without training and experience and such independence of character as makes the official indifferent to mere political preferment. The tenure of office and salary paid should be such that there would be no difficulty in obtaining for these places the best qualified men in the country. The work thus far done by the railway commissions, state and federal, while largely preliminary or formative, gives earnest of the permanent value of this governmental function. The public is coming to recognize its importance and no doubt will insist upon any changes either in the law or in its administration which are necessary to make the experiment of public regulation a success rather than a failure.

I have aimed briefly to point out the importance, not only to the railways but to the public, of government regulation of railways. I have shown, I think, that without such regulation neither the public interest nor that of the railways was fully protected. Some measure of regulation was therefore necessary. It may be that the regulation which has ensued has gone beyond the best and wisest limits, but I do not think it material to raise that question, for, after all, a wise and enlightened administration of the present laws upon this subject will, I am satisfied, be successful, whereas, the best laws possible would result in failure if unwisely, ignorantly, or viciously administered. So the administration of our present laws is the all important thing, and that, of course, largely depends upon the men who constitute the Interstate Commerce Commission and the railroad commissions of the different states. There are possible conflicts between the national and state authorities which may only be solved by additional legislation, but in good time that will be provided, if necessary. And while the leading responsibility for success or failure of government regulation must rest upon the railway commissions, I have frankly stated that the railway officials cannot escape a large responsibility, and their duty is plain to co-operate with and aid the government officials in every reasonable way. Where the officers of the government go beyond the limits of constitutional power, and such acts affect the

vital interests of the railways, there is no recourse other than an appeal to the courts of the country. But I hope the period of litigating questions of constitutional law upon this subject has largely passed and that the effort of all officials and parties interested will henceforth be loyally devoted to solving the question at hand in the best interest of the public, for, if that is done, I am certain that the railway interests will be fully protected.

CANALS AND RAILWAYS*

BY W. M. ACWORTH.

(From *The Railway Gazette*.)

"The old way need not then be true,
O brother men, nor yet the new.
Oh yet awhile the old retain,
But yet consider it again."

That canals played a great part in the development of this country in the early days of what it is customary to call the industrial revolution is certain. Perhaps nowhere did they play a greater part than in Birmingham and the country round it, no doubt because Birmingham, being further from the sea than any other great town in the British Isles, had greater need for improved communication, and therefore the energy of its citizens met that need by the construction of a system of waterways which spread wider and covered the ground more closely than anywhere else.

Canals still play an important part in the industrial life of Birmingham. But since the time when what is now the North-Western Railway was constrained to become — shall I say foster-mother or step-mother? — to the Birmingham Canal Navigations, now about 70 years ago, the canals in this country have remained practically stationary. Broadly speaking, in size, in equipment and in organization they remain what they were at the beginning of the railway era.

We are now invited to adopt a forward policy, and to spend large sums of money in modernizing our canals. It is admitted that this money will not be found by private capitalists. In some shape or form it must be furnished by public resources, either local or national. Clearly, then, the question is whether it is in the public interest that such money should be so found. And the spirit in which the question should be discussed is, I suggest, that of the quotation from Clough which I have put at the head of this paper. We have with us the old method of canals, the new method of railways, and the yet newer method of road transport by power-driven vehicles, and it is for economists to consider, in the light of the best scientific, financial, and commercial evidence they can obtain, whether it is possible to restore

* A paper read before the British Association at Birmingham, September 12.

to the canals some measure of their old importance or whether the newer methods have definitely and irrevocably supplanted them.

At the outset let me call attention to a fact which, though it might seem too elementary to be worth mentioning, is yet, as far as my experience goes, more often than not ignored in the discussion of this question. Railway traffic is in every country expected to pay the total cost of dealing with it. The railway rate has to cover, not only the cost of handling the traffic, but the maintenance of the road over which it is carried, and interest on the capital invested in construction and equipment. The position of canals is radically different. Canal traffic in France is not only protected from railway competition by the rule that railway rates must be kept 20 per cent above canal charges, but the canal charges cover nothing except actual carriage. The use of the canal, with maintenance and water supply provided and capital charges paid, is handed over, free, gratis, and for nothing, by the State to the carrier. The same thing is practically true in Germany, where canal tolls are so small as to be almost negligible. It is entirely true in the case of the only artificial waterway of any importance in the United States, the Erie Canal. But costs of maintenance and capital charges, though not borne by the consumer, the canal user, have to be borne by somebody; namely, the whole body of taxpayers, local, it may be, or national, or both in combination. And it is evident, therefore, that in any discussion from the public point of view of the benefits to be derived from a forward canal policy we have to consider, not merely the cost of canal carriage paid by the user, but the total cost to user and community together.

Now the tax-paying community, be it observed, is spread all over the country from Land's End to John o' Groats. Canals can be made in the flat country of the Midlands, or the East Coast. They cannot be made in Cornwall, Cardigan, Carnarvon, Cumberland, or Caithness. And yet, if canals are to be made at national expense, all these countries will be called on to contribute. It is admittedly justifiable to call upon a certain section of the community, the rich, to help from their abundance another section, the poor. But, broadly speaking, it is the flat country that is rich, and the hilly country that is poor. And to call upon the poor to subsidize the rich is a policy the justification for which it is not easy to see. This, however, though an important point, is by no means the most important. The really vital question is whether canals possess any economic advantage in competition with railways. To put it another way, is it cheaper to carry a ton a mile on a canal than on a railway, when the total cost of

carriage, that paid by the public as well as that paid by the user, is taken into account? As far as I know, all the evidence points in one direction: carriage on a narrow artificial waterway is — except in quite special circumstances, such as those, for instance, of the Suez, or the Aire and Calder canals — an uneconomical method of transport.

That in England the canals have lost their traffic to the railways we all know. Even making all possible allowance for the so-called railway “throttling,” the fact is surely significant. In the United States, also with free competition, the bulk of the canals are dead, and even the Erie Canal, once a main highway of traffic from the Great Lakes to the ocean, has ceased to be of any importance, not merely as a carrier, but even as a regulator of railway rates. But on the continent of Europe the position is quite different. We may leave out of consideration Belgium and Holland, whose conditions are not comparable with ours, as their canals had to be constructed and would need to be maintained for drainage purposes, even if they carried no traffic. But in France and Germany canals still carry a considerable traffic, though it is by no means so considerable as it is often supposed to be by people who confound together two quite separate things, the traffic on great rivers like the Seine, the Elbe, and the Rhine, and the traffic on purely artificial waterways.

Why, then, do canals in Germany and France retain traffic while canals in England and America have almost entirely lost it? The answer is quite simple: Because in France and Germany the individual consignor saves money by using the canal. He pays nothing, or almost nothing, except actual cost of carriage, roughly, and on the average, perhaps half the total cost. Unless we can satisfy ourselves — which, as I have said, seems to me difficult — that it is reasonable that the State should subsidize certain traders and certain localities — presumably richer and not poorer than their unsubsidized rivals — at the expense of the community at large, the question of real interest for us in England is whether the French and German trader would continue to use the canals if he had to pay not merely carriage cost but total cost. Now on this point the evidence seems to me perfectly clear, that total canal cost both in France and Germany is higher than total railway cost. I cannot, of course, within the limits of this paper attempt to do more than allude to it. For France I will just say this: The report made to Lord Shuttleworth’s Canal Commission by their sub-Commissioner, Mr. Lindley, says that, whereas on the railways of France the total cost is .55d. per ton km., the total

cost on the waterways is .5d. per ton km. And the canals for this higher average cost carry low class traffic, in bulk, through flat country. The railways carry traffic of all kinds, high class as well as low, large consignments and small, not only in the rich plains of the north, but across and between the mountainous districts of the south. For Germany I would refer those who desire to pursue the subject further to the excellent book published last year by Prof. Moulton, of the University of Chicago. I will give, as perhaps the best single instance, a summary of his elaborate figures in reference to the Dortmund-Ems Canal, 150 miles in length, opened in 1899 as an outlet from the Westphalian coalfield to the North Sea. He states that the canal carried nearly 2,500,000 tons per annum, the bulk of it coal and iron ore, which traverse the entire length of the canal through an absolutely flat country. The trader pays 5d. in dues and about 4s. for haulage. The further cost of maintenance and interest charges, not covered by dues, but furnished from public sources, national and local, brings up the total cost for an average distance of 123 miles to 7s. a ton. This is just about the same as the English rate for coal from the Derbyshire and Nottinghamshire coalfields to London, an average distance of, say, 140 miles. Prof. Moulton adds that if this traffic were carried by railway at the railway scale rate for coal, the total charge would be 5s. a ton; if at the average rate charged for all commodities, high class and low class together, it would be 7s. 2d. And it should be added that at these rates the Prussian railways make so handsome a profit that they are able, after paying not only carriage cost but also maintenance and interest on capital, to hand over something like £15,000,000 per annum in relief of the general taxation of the country.

I met quite recently a distinguished economist who said that the idea that canal traffic was intrinsically dearer than railway carriage was to him quite novel. So, as there may be other people in the same position, let me summarize very briefly the reason why this is so. They will be found admirably stated in Colson's "*Transports et Tarifs*." A canal costs on the average even in flat country more to build than a railroad, not only per mile, but still more between two given points, for the canal route between A and B is generally about half as long again as the railway route. When built a canal can only carry a much less volume of traffic, especially where locks are required, as in England they must be. Canal operation is seldom carried on by night, and is liable to long interruptions from frost, from lack of water, and from the necessity of emptying for repairs. Railroads can

earn revenue day and night all the year round. A canal can only compete for the carriage of low-class goods in large consignments which can only bear low rates. All the revenue it earns must come from them. The railroad, while making such profits as it can from this class of traffic, earns the bulk of its revenue from the carriage of passengers, parcels, mails, and high-class merchandise, which can bear high rates. Further, the railroad can go where the canal cannot follow it. It can be brought not only into the works, but actually into the shop or forge, or the warehouse. Canal carriage is handicapped by the necessity of transfer between the wagon or truck and the barge at either end of the journey. It is true that, as regards capital expenditure, a barge and horse are cheap by the side of a locomotive and train of trucks. But the train covers 20 miles while the barge covers two; and so the balance is at least redressed. It will naturally be asked: "If this be so, why do the French and German governments continue to spend money on canal development?" Again the answer is quite simple. Sentiment is on the side of the canal:

"Men are we and must grieve when e'en the shade
Of that which once was great has passed away."

Further, the railway is a big, inaccessible impersonal monopoly. Railways — companies or State organizations — are never loved, and are usually disliked and misjudged. An individual canal carrier, a personal Mr. Brown or Mr. Robinson, is much more prone to command sympathy. Lastly, and chiefly, traders and localities who stand to gain by a forward canal policy are organized and vocal; the taxpayers who stand to lose are unorganized, uninformed and inarticulate.

To sum up, I submit that, *a priori*, we should expect the total cost of canal transport to be not less, but more than that of railway transport. *A posteriori*, the evidence available, not only from England and America, but from France and Germany, shows that it is so. Canal carriage can only compete with railway carriage if it is subsidized from outside. The adoption of a forward canal policy at the public expense cannot, therefore, be justified as in the interest of the community as a whole. If any local communities or particular trades demand its adoption, it lies on them to prove their right to eleemosynary assistance out of the pocket of the general taxpayer.

LEGISLATIVE REPORT OF THE PERE MARQUETTE

Printed by order of the Michigan Senate.

In February, 1913, a Joint Committee of the Legislature of the State of Michigan was appointed to investigate the Pere Marquette Railroad Company. After an exhaustive inquiry into the organization, history, and affairs of the corporation, this committee submitted a report in which it found the reasons for the road's present predicament to be, in brief, as follows:

1. Poor management.
2. Advance in wages, about 43% since 1900.
3. Increased cost of locomotives, cars, ties, rails, and all classes of equipment.
4. Increase in taxes from \$478,000 in 1907 to \$668,000 in 1912, attended by
5. A decrease in average passenger and freight receipts.

In regard to the road's capitalization, the committee found as follows:

Much has been said and printed about watered bonds, but your committee is satisfied that the money represented by the funded debt of approximately \$70,000,000 has been paid into the Pere Marquette corporation; that all the bonds are honest; that none of them are watered, and that the persons owning them have honest claims against the Pere Marquette on account of said bonds.

As to whether the original capital stock amounting to \$26,223,000 above mentioned represents dollar for dollar paid into the Pere Marquette your committee has been able to secure little information. The fact that there is such a heavy debt against the road in bonds has led us to believe that the question as to whether the stock was or was not in any degree watered is of little importance at this time. The most hopeful do not expect that dividends can be earned upon the stock in the near future, if ever.

CONCLUSIONS.

The statement of the Committee's conclusions was as follows:

The magnitude and importance of the subject referred to your committee is such that we have been able to give the matter but very imperfect consideration. The questions involved in the Pere Marquette inquiry are worthy the time and attention of a more permanent body with expert training. This is true not only with regard to the Pere Marquette Railroad but also because the questions involved

in this inquiry are questions constantly arising in connection with all public service corporations. **The continued operation of the Pere Marquette Railroad is absolutely essential to the welfare and prosperity of the people of the State of Michigan.** Under present laws the State in substance limits the income of the railroad by regulation of its passenger and freight rates. The outlay of the railroad is also in great degree determined by circumstances not under the control of the railroad. It has little to say as to the amount of wages it has to pay, which is the largest element in its expense. The State tells it that it must expend large sums in modern service requirements and safety appliances. It will thus be seen that the State in large measure says both how much it shall earn and how much it shall spend. Under such circumstances every fair minded person will agree that, granting honest, economical, and efficient management, any capital honestly invested in a railroad is entitled to receive a fair return on such investment.

We believe that the capital represented by the bonded indebtedness, while some of it has been unwisely expended, was honestly invested by the bondholders. It is the claim of those financially interested in the road that the State has prevented the earning of a fair return on this investment through the following means:

TWO CENT FARE LAW.

In 1907 the Legislature passed a law limiting the passenger fare to two cents a mile on all railroads, the gross earnings of which equalled or exceeded \$1,200.00 per mile for each mile of road operated by any given company. While we believe that this is only a comparatively small element in the troubles of the road we are satisfied that a flat rate of any amount applied alike to both main lines and branch lines of this road is not a proper method of regulation.

This and other railroads keep all passenger receipts separate from all freight receipts but do not and possibly cannot keep all passenger expenses separate from freight expenses. This makes it difficult for this railroad or any railroad employing the system to show with accuracy and certainty just how much money they are making or losing on passenger business. Some elements that enter into the consideration of such a question must always be estimated. The Pere Marquette claims that its estimates are sufficiently accurate to show that its passenger business does not pay the expenses of operation. We do not think this is true; but, as before stated, it was impossible for the road to show us exactly what their passenger expenses were. If there is a loss on their passenger business, however, we are thoroughly satisfied that it arises upon the branches and less important lines, some of which, the testimony shows, do not even pay the cost of operation. We are satisfied, as above intimated, that the Pere Marquette is making money in its passenger business on some of its more important lines and losing money on some of its less important lines.

FREIGHT RATES.

At least two-thirds of the freight carried on the Pere Marquette is interstate and the rates charged for such freight are regulated by the Interstate Commerce Commission and not by the State.

Michigan lies in a traffic division having the lowest interstate freight rates in the country, and whether they are adequate or not is something over which the State has no control. We feel that the interstate freight rates, determined, as they are, by the business of large trunk lines with which the Pere Marquette has to compete, in the division of which Michigan is a part, are inadequate as applied to this road, and that the State might well aid in securing a readjustment. So far as freight within the State is concerned it comprises less than one-third of the volume of business, and while the rates are subject to the control of the Railroad Commission, they are undoubtedly determined largely by interstate rates.

TAXES.

In 1901 the State changed its basis of taxing railroads from a specific tax on gross earnings to a tax based on the physical valuation of the property. The constitution of Michigan provides that all property shall be assessed at its true cash value, and while there has been loud complaint on the part of the railroads that other property is underassessed, your committee does not believe that the same is equally true of the Pere Marquette Railroad, assessed, as it is, at only \$25,600,000.00.*

While we believe that all of these matters have had an influence on the existing conditions of the Pere Marquette Railroad, it is our opinion that they are all of minor importance as compared with the manipulation and mismanagement of the road and its acquisition of many unprofitable branch lines.

It is not necessary to repeat at this point details of the manipulation and mismanagement, as they have been fully covered in what preceded.

As to the branch lines the testimony shows that many of them are operated at an actual loss and are a heavy drain on the company's income from other lines.

While the committee believes that the traffic from Buffalo over the Canadian lines intended for shipment to the northwest may be profitable, it is almost certain that the traffic over those lines with Chicago is unprofitable on account of the roundabout route and heavy grades, the rate being determined by shorter and more direct lines with lower grades. **However, the lines of the Pere Marquette which may be properly denominated branch lines form a network of railroad over the State which is of very great importance to the State and to its development, in many instances being the only means of**

* It is the taxes paid and not the assessment that tells the tale. In 1901 the Pere Marquette paid \$282,174 in taxes against \$667,704 in 1912, an increase of over 136%.

transportation for prosperous communities. While, as indicated, these branch lines do not result in a profit to the company, yet it is imperative for the good of the State that their operation should be continued, and we believe that some legislation should be provided permitting the Pere Marquette to charge enough on such lines to pay what the service costs, as arbitrary freight or passenger rate covering alike the productive lines of the Pere Marquette and the unproductive lines is unfair. This is a subject that we believe the State ought to investigate comprehensively in order that the patent injustice above mentioned may be remedied.

As we have said before, we believe that the present management under the receivership is capable and that it is doing its utmost to improve the service, to increase the gross revenues, and to decrease the cost of operation. We further believe that it is for the best interests not only of the State but of those interested in the road that the receivers should be given a reasonable opportunity to demonstrate whether or not the road can be made to earn its fixed charges. If after such opportunity the receivers have not succeeded in demonstrating that it can so earn its fixed charges, a reorganization must be had on a basis that will be sound. The owners of the road under the law of 1909 apply to the Michigan Railroad Commission to secure the authorization of such reorganization and they, themselves, should not ask for reorganization on other than a sound basis, as it would only result in another receivership in the course of time.

Another matter of importance in considering the affairs of the Pere Marquette is the natural depreciation of the company's equipment. From 1900 to 1907 the Pere Marquette charged off nothing for depreciation of equipment, although it claims to have taken care of the said depreciation by repairs and replacements. Since 1907 the company has charged off annually one-half of one per cent on account of depreciation of equipment.

A considerable portion of the funded debt of the Pere Marquette has been created because of the fact that the road did not, out of its earnings, take care of the depreciation of its equipment, and when said equipment became obsolete or worn out the road was compelled to issue bonds to provide money with which to purchase other equipment to take the place of the old. While we believe it proper for the Pere Marquette to have borrowed money on bonds to purchase additional equipment as it needed the same, yet we believe that all natural depreciation should be taken care of from year to year out of the earnings, which certainly, in the case of the Pere Marquette, was not done. With the road managed as it was it is quite possible that it was not able to do this; but it is our opinion that, presuming honest, economical, and efficient management, the Pere Marquette Railroad or any railroad be permitted to earn enough profit each year to offset the natural depreciation.

Those in charge of the Pere Marquette ascribe the present difficulty of that road to the following:

A decrease in average passenger rates.

The increase of taxes.

Added burdens laid upon the road by the State in compelling it to adopt safety appliances and to operate, in large measure, under the control of the State.

To the increase in wages.

And to the increase in cost of nearly all the supplies of every kind it has to buy.

There can be no question but that the above matters have had an influence in bringing the Pere Marquette into its present financial difficulties, and it is possible that with the added burdens above mentioned, which the property now has to bear, the road, even under the best of management, could not be successfully operated, but as in this report heretofore stated, your committee is of the opinion that the manipulation and the mismanagement of the property during much of its life has had a far greater influence in bringing the road to its present condition than all the above causes combined.

The subjects mentioned above are large and your committee hardly feels warranted in positively stating some of the conclusions it has reached in this report. The importance of the road to the State is such that we feel that the State ought to provide in some way for a full, complete, and comprehensive examination of the facts in question, to the end that the road may be successfully operated; that it may serve the State and its people properly, and that those investing in its property may receive a reasonable return upon their investment. As those who have had large experience in the operation of the road disagree as to what it can be made to do in the way of net earning, your committee cannot assume to report to any extent upon that. The receivership will, if continued for a long enough time, afford to the people of the State an opportunity to find out just what the property can be made to do.

We realize that some of the statements made in the conclusions reached in this report are not in accordance with the prevailing ideas concerning the Pere Marquette or the regulations to be provided by the State. We understand, however, that we were appointed to ascertain and report the truth of the matters involved and to make such recommendations as we were able to make in accordance with our judgment. To those who may be inclined to criticise the statements contained in this report or the judgment of the committee we respectfully advise a careful study of the many volumes of testimony we have taken during this investigation. These volumes are in duplicate and we recommend that they be bound in permanent form and that one set be filed in the offices of the Railroad Commission and the other in the office of the Attorney General. We recommend also that this report be printed.

Very respectfully submitted,

JOHN Q. ROSS,

ORVICE R. LEONARD,

WILLIAM M. SMITH,

A. V. YOUNG,

LEONARD D. VERDIER,

Pere Marquette Investigating Committee.

THE WORLD'S GREATEST TUNNELS

From *The Engineer*, November 28, 1913.

As no work of reference or history of tunnelling appears to give a complete list of the longest railway tunnels down to date, the following tables of the world's greatest tunnels have been prepared, the completion and opening of the Lötschberg this year permitting the inclusion of this tunnel. Table I gives all the tunnels, except town tunnels, in Europe which attain two miles in length, together with a few of lesser length, which possess some particular interest. Town tunnels are likewise excluded from Table II — the longest tunnels out of Europe.

TABLE I.—TUNNELS IN EUROPE OF TWO MILES IN LENGTH.

Ref. No.	Name of tunnel.	Country.	Length.	Summit level.	Opened for traffic.
			M. yds.	Feet.	
1	Simplon*	Switzerland-Italy	12 458	2313	1906
2	St. Gothard	Switzerland-Italy	9 564	3788	1882
3	Lötschberg	Switzerland	9 55	4077	1913
4	Mont Cenis	France-Italy	7 1730	4248	1871
5	Arlberg	Austria	6 404	4300	1885
6	Ricken*	Switzerland	5 610	650	1910
7	Tauern	Austria	5 546	4020	1909
8	Ronco	Italy	5 277	...	1888
9	Tenda*	Italy	5 56	3260	1899
10	Karawanken	Austria	4 1683	2088	1906
11	Jungfrau*†	Switzerland	4 834	11,220	1912
12	Borgallo	Italy	4 700	...	1887
13	Severn	England-Wales	4 636	...	1886
14	Turchino*	Italy	4 10	...	1900
15	Wocheiner	Austria	3 1647	1761	1909
16	Albula*†	Switzerland	3 1150	6133	1903
17	Totley	England	3 950	...	1893
18	Peloritana*	Sicily	3 686	...	1885
19	Gravhals*	Norway	3 516	2844	1909
20	Standedge	England	3 60	...	1850
21	Woodhead	England	3 13	...	1845
22	Bosruck*	Austria	2 1693	2405	1906
23	La Nerthe	France	2 1581	...	...
24	Kaiser Wilhelm	Germany	2 1069	...	1879
25	Echarmeaux	France	2 1020	...	1895
26	Blaisy	France	2 990	...	...
27	Sodbury	England	2 913	...	1903
28	Credo	France	2 800	...	...
29	Vizzavona*†	Corsica	2 778	2971	1889
30	Disley	England	2 346	...	1902
31	Col de St. Michel*†	France	2 292	...	1901
32	Bramhope	England	2 234	...	1849
33	Festiniog*	Wales	2 206	...	1879
34	Cowburn	England	2 182	...	1893
35	Meudon	France	2 134	...	1900
36	Giovi	Italy	2 45	1890	...
37	Col des Loges*	Switzerland	2	3200	...
38	Cermolina*	Italy	1 1748	...	...
39	Cairasca*	Italy	1 1520	...	1906
40	Hauenstein	Switzerland	1 1210	...	...
41	Semmering	Austria	0 1333	2940	1850

TABLE II.—THE LONGEST TUNNELS OUT OF EUROPE.

			M.	yds.	Feet.	
42	Hoosac.....	United States.....	4	685	....	1876
43	Khojak†.....	Baluchistan.....	2	769	....	1892
44	Suram.....	Caucasus.....	2	750	....	1895
45	Caldera*	Peru.....	1	1320	15,774	1893
46	Beacon Hill*	China.....	1	644	....	1910
47	Transandine*†	Chile-Argentine.....	1	551	10,500	1911

TABLE III.—LONG EUROPEAN TUNNELS NOW BEING CONSTRUCTED.

			M.	yds.	Feet.	
48	Hauenstein Base.....	Switzerland.....	5	0	....	....
49	Somport*.....	France-Spain.....	4	1512	....	....
50	Grenchenberg.....	Switzerland.....	4	0	1787	....
51	Puymorens*.....	France-Spain.....	3	317	....	....
52	Mont D'Or.....	France-Switzerland.....	3	1395	....	....

* Single-line tunnel. † One metre gauge railway. ‡ Standard gauge of India.

The tunnels with no mark against them are standard gauge — 4 ft. 8½ in.— single or double tracks.

Electric traction is employed in the Simplon, Lötschberg, Ricken, and Jungfrau tunnels. Steam locomotives burning liquid fuel have been tried in the Arlberg Tunnel, which is extremely difficult to ventilate efficiently, and are exclusively used in the Caldera Tunnel. It is now proposed to electrify the Arlberg Railway between Bludenz, the great tunnel, and Landeck, a distance of 25 miles. The Lötschberg-Simplon Railway — Spiez to Brigue, 46 miles — is electrically equipped, and is the first Alpine railway with great traffic to be so worked.

NOTES.

1. The nucleus of the Simplon's second single-line tunnel already exists in the form of a parallel heading, measuring, roughly, 8 ft. in height by 10 ft. in width, and connected to the eastern or running tunnel by transverse galleries every 220 yards. When the heading is enlarged the axes of the two tunnels will be 56 ft. apart.

Although two lines of way are laid in the Lötschberg and Arlberg tunnels, the approach lines are single.

4. The Mont Cenis Tunnel is hardly appropriately named, as the culminating point of the Mont Cenis lies 17 miles to the east of the tunnel, which is carried through the Col de Frejus.

5. The Arlberg Tunnel connects the province of Vorarlberg with the rest of the Austrian Tyrol. Its object was to furnish a direct outlet for Austro-Hungarian products to Switzerland, independent of

the South German railways, over which the traffic was formerly directed.

6. The Ricken Tunnel is on the new railway from Utnach to Wattwil, 9 miles in length, which links up the industrial Toggenberg Valley with the Lake of Zurich. It is the second longest single-line tunnel in the world.

7, 10, 15, 22.—The Tauern, Karawanken, Wocheiner, and Bosruck tunnels belong to a new system of Austrian Alpine railways, which furnish a second line between Vienna and Trieste. The Karawanken Tunnel lies between the two stations of Rosenbach and Assling; the Wocheiner on the line joining Assling and Goerz; and the Bosruck passes under the Phyrn Pass.

8. The Ronco Tunnel lies north of Genoa.

9. The tunnel through the Col di Tenda is on a branch line from Cuneo — 55 miles from Turin — to Viévola. The latter station at the southern portal of the tunnel is the present terminus of the line, which is now being extended down to the valley of the Roya to Ventimiglia, 32 miles away. The earliest mention that we have of tunnelling in connection with the Alps concerns the Col di Tenda, and dates back to the fifteenth century. Anne, Duchess of Savoy — married 1433 — who was considered by her contemporaries the most intellectual woman who had ever lived, conceived the grand project of piercing this mountain, then, and for nearly two and a half centuries afterwards, the best and easiest pass available between France and Northwest Italy, with a tunnel at about one-third of its height from the summit. It appears beyond doubt that the works were begun, but at the death of Anne in 1463 they were abandoned. After a lapse of three centuries they were resumed in 1782 by order of Victor Amadeus III., King of Savoy. The excavation of the mountain was continued, although not vigorously, until 1794, when it was stopped in consequence of the invasion of Savoy by the French. The total length of the tunnel would have been about 3000 yards, and by means of it a precipitous sugar-loaf ascent of 1300 ft. to the top of the pass would have been avoided. With some alterations this project was carried to a successful issue in 1883. The new road constructed in that year penetrates the Tenda by means of a tunnel about $1\frac{1}{2}$ miles long, forming the longest road tunnel in the world. The altitude of the north entrance is 4300 ft.; that of the south 4196 ft. From the central point both ends are visible. The old road over the fortified heights of the Col di Tenda, where the Maritime Alps terminate and the Ligurian Alps begin, is now closed to ordinary traffic.

11. The Jungfrau Railway is of one metre gauge, and for most of the distance requires a rack rail, the Strub being the type employed. The tunnel commences at Eiger Glacier, 7621 ft. above datum, and extends to Jungfraujoch. The dimensions of the tunnel are:—Maximum width, 11 ft. 9¾ in.; maximum height, 13 ft. 11 in.

12. The Borgallo Tunnel lies between Parma and Spezzia, between the stations of Borgatoro and Grondola-Guinadi.

13. The Severn Tunnel is the longest subaqueous tunnel in the world.

14. The Turchino Tunnel is on the new line from Genoa to Asti, which has a total length of 62 miles and a tunnel mileage of more than a quarter of that of the whole line. The gradient of the great tunnel is 1 in 83 rising from south to north.

16. The Albula or Engadine Tunnel lies between the two stations of Preda and Spinas. It is the highest of the Alpine series, with the exception of the Jungfrau, but the latter belongs to rather a different category.

18. The Peloritana Tunnel pierces the ridge sheltering Messina from the north.

19. The Gravehals Tunnel, on the Bergen Railway, runs through the Urhvide Mountain at a depth below its summit of 1698 ft. At its east entrance is Myrdalen Station, and at its west entrance Opset Station. The tunnel is nearly level, rising only 55 ft. from west to east. Immediately east of Myrdalen Station is another long tunnel, the Reinunga, 1968 yards.

20. The Standedge Tunnel, on the Huddersfield and Manchester Railways, between Marsden and Diggle stations, held pride of place as the longest in the kingdom until the Severn was completed. The original single-line tunnel has been augmented by a second and also by a double-line tunnel, all abreast, driven through the "millstone grit" series of the Pennine Range. There is also a fourth tunnel, of much smaller section, at a lower level, and 114 yards longer than the above, through which flows the Huddersfield Canal, with 8 ft. depth of water.

21. The Woodhead Tunnel consists of two parallel single-line tunnels, the second being opened in 1852.

23. La Nerthe, the longest tunnel in France, is on the P. L. M. main line, between Avignon and Marseilles, the stations on either side being Pas-des-Lanciers and L'Estaque. It is ventilated by twenty-two shafts, one of which is 607 ft. deep.

24. The Kaiser Wilhelm Tunnel, the greatest work of this kind

in the German Empire, is on the line Coblenz-Treves, and between the two stations of Eller and Cochem. With the rapid increase of traffic through the tunnel between the years 1895 and 1900 the air became so foul as seriously to inconvenience platelayers and passengers on trains. It was ventilated in 1901 on the Saccardo system, as successfully applied in the St. Gothard. This system has also been installed in the Wocheiner and other tunnels.

25. The Echarmeaux Tunnel is on the P. L. M. line from Paray-le-Monail to Lozanne.

26. The Blaisy Tunnel is on the P. L. M. main line north of Dijon.

28. The Credo Tunnel pierces the Jura Mountains and is situated immediately east of Bellegarde on the joint P. L. M. and Italian line from Culoz to Geneva.

29. The Vizzavona Tunnel is on the (French) State Railways of Corsica, Bastia to Ajaccico.

31. The metre-gauge tunnel through the Col de St. Michel is in the Department Var.

36. The Giovi Tunnel runs through the ridge of the Apennines on the line from Genoa to Turin and the North.

37. The tunnel under the Col des Loges is on the very steeply graded line from Neuchâtel to Chaux de Fonds. At the north end of this tunnel is a solitary station, Les Convers, and immediately beyond the line enters another tunnel, three-quarters of a mile long, under Mont Sagne. The open space between these tunnels is so short that it might almost be a shaft.

38. The Cremolina Tunnel is on the Genoa-Asti line.

39. The Cairasca Tunnel is on the approach line to the Simplon Tunnel from Domodossola. It is a spiral tunnel and the longest of that type in the world, which distinction is now being erroneously claimed for the Transandine Tunnel. The difference of levels between the south and north portals of the Cairasca is 307 ft. None of the seven spiral tunnels on the St. Gothard Railway is more than one mile in length, and none makes a greater ascent than 118 ft.

40. The Hauenstein Tunnel is on the highly important section of the Federal Railways between Basle and Olten. The gradients on the approaches to and inside this tunnel are so steep that a base tunnel is now under construction.

41. The Semmering was the first Alpine tunnel. It pierces the Noric chain near the summit of the pass. The Semmering Railway,

from Vienna to Trieste, was built for the Austrian Government by the engineer Carlo Chega, between the years 1848-54.

42. The Hoosac Tunnel, between Troy and Springfield, took twenty years to construct, but there were several suspensions of work.

43. The Khojak Tunnel is the longest in Asia. It pierces an historic pass across the Khwaja Amran offshoot of the Toba-Kakar Mountains. It is on the Chaman extension — 29.35 miles — of the Sind-Pishin section of the North-Western Railway of India, which extension was built between the years 1888-91 in consequence of the fear of Russian aggression. Two lines are laid through the tunnel. The gauge is the standard gauge for India, i. e., 5 ft. 6 in. When railways were first proposed in India it was considered that a gauge wider than the normal was desirable, as the narrower would be inadequate against cyclonic storms, so frequent at certain seasons of the year. The Khojak, like most other tunnels near the northwest frontier of India, is guarded at each end by strong iron gates.

44. The contractors for the Suram Tunnel were Brandt, Brandau & Co., of Hamburg. The successful accomplishment of this work established the reputation of the firm, and brought them the contract for the construction of the Simplon Tunnel.

45. The Caldera is the summit tunnel on the Central Peruvian Railway across the Western Cordillera. This line ascends to the most elevated spot reached by any railway in the world, the summit level representing approximately the height of Mont Blanc. The gradient on the line is sufficiently steep to allow of a wagon descending by the sole action of gravity from the tunnel to the Pacific, a length of 106 miles.

46. The Beacon Hill Tunnel is on the British section of the Kowloon-Canton Railway. It is the longest in China, having speedily wrested that distinction from the tunnel in the Nankow Pass, under the Great Wall — 1190 yards — on the Peking-Kalgan Railway.

47. The Transandine Railway is British owned, and both the engineers and the contractors were British. The great tunnel through the Cumbre of the Cordillera is a spiral tunnel. This tunnel lies at an elevation nearly 1500 ft. higher than the highest carriage road in Europe.

48. The Hauenstein base tunnel is on the new alternative line between Sissach and Olten. Many non-technical reports of the opening of the Lötschberg-Simplon Railway have referred to this tunnel as being undertaken in order to improve the northern approach to the

new Alpine tunnel. Its chief aim, however, is to give a better approach via Lucerne to the rival St. Gothard route, and it will have little, if any, concern with the Lötschberg. Evidently it has been confused with the Grenchenberg Tunnel — 50 — on the new line from Moutier under the Jura Mountains to Lengnau, a station about midway on the line between Soleure and Biel. The Grenchenberg will effect a considerable cut off to the Lötschberg, as from the Eastern Railway of France system.

49. The Somport is the international tunnel on the Noguera-Pallaresa route across the Pyrenees. The line has already been constructed by the French Government up to Esteri, the last French station before arriving at the tunnel.

51. The Puymorens Tunnel is on a second new Trans-Pyrenean line to connect Aix-les-Thermes, on the Midi system, with Ripoli, in Spain. The French station at the tunnel mouth is Hospitalet. Both of these Trans-Pyrenean Railways have decided to employ electric traction and therefore steeper gradients than are practicable with steam propulsion have been introduced.

52. The Mont D'Or Tunnel is on the new Frasné-Vallorbe line, avoiding Pontarlier. It will shorten and otherwise improve the P. L. M. route to Lausanne and the Simplon. The headings met on Oct. 3rd last.

The following long tunnels are projected:—Faucille Pass Railway, Lons le Saunier to Heyerin, three tunnels, 6.6, 9.4, and 4 miles in length respectively; Mont Blanc Railway, Chamonix to Courmayeur, two tunnels, 8 and 3 miles in length respectively; Splügen Railway, Thusis-Rothenbrunnen-Chiavenna Tunnel, 17 miles; Rigoroso Tunnel, between Genoa and Tortona, $12\frac{1}{4}$ miles.

WAR TIME RAILROADING IN MEXICO

BY MAJOR CHARLES HINE,

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For nearly three years past Mexico has suffered from what are politely termed "political conditions." The various participants have expressed their opinions in terms of force and violence. Thousands of lives have been sacrificed; millions of dollars worth of property have been destroyed. Railways have suffered severe losses, both by the destruction of physical property and by the paralysis of revenues, resulting from prolonged interruptions to traffic.

The normal method of procedure includes the burning of all wooden bridges in the theatre of operations. The smaller the band the greater seems its conception of the importance of preventing pursuit by destroying railway bridges. The topography and climatology of Mexico are such that provision must be made for adequate drainage in cases of sudden and severe rainfall. The greater part of these openings are as yet bridged by wooden structures. Traffic can, therefore, easily be tied up and operation nullified by a few bridge burners. The Southern Pacific Railroad of Mexico alone has found over three hundred (300) bridges burned in the last three years. The number destroyed on the other railways of the Republic must run into the thousands.

It may be stated for easy remembrance that there are something like sixteen thousand (16,000) miles of railway in the Republic of Mexico. A little over one-half of this mileage, or something like eight thousand (8,000) miles, is comprised in the National Railways of Mexico, known among English-speaking people in Mexico as "the merger." This system includes, among other subsidiaries, the old National Railroad of Mexico, the Mexican Central, the Mexican International, the Inter-Oceanic (narrow gauge), the Mexican Southern (narrow gauge), the Vera Cruz to Isthmus, and the Pan American. These various subsidiary corporations are operated under leases and different working arrangements by the National Railways of Mexico, in effect both a holding and an operating company. A majority of the stock of this controlling company

*Paper read before the St. Louis Railway Club, St. Louis, October 10, 1913.

is owned by the Federal Government of Mexico. The bonds are largely held in foreign countries, including the United States. Although certain ministers and officials of the Mexican Federal Government are exofficio members of the Board of Directors, the National Railways of Mexico have a working president, Mr. E. N. Brown, and all the corporate, executive, general, and minor officials usually found on American railways. This unique condition is sometimes described as "government partnership" in contradistinction to the government ownership of other countries.

The next largest railway under single control is the Southern Pacific Railroad of Mexico, owned outright by the Southern Pacific Company, and of which twelve hundred and fifty (1,250) miles have thus far been finished. The main line of this road is not yet completed. It reached the City of Tepic, the capital of the Territory of Tepic, in February, 1912. Previously, some forty (40) miles had been constructed, north from Orendain Junction, on the National Railways (near Guadalajara, State of Jalisco, the second city in the Republic). The above-mentioned "political conditions" have prevented the construction of the intervening portion of approximately one hundred (100) miles.

Next in mileage comes the Mexico Northwestern Railway, of approximately five hundred (500) miles, owned by Dr. F. S. Pearson and associates, and operated in connection with large lumber mills at El Paso, Texas, at Pearson, and at Madera, in the State of Chihuahua. This road, lying entirely within the much troubled State of Chihuahua, has probably suffered the greatest percentage of depredations per mile of line of any railway in the Republic.

The fourth railway in mileage is the Mexican Railway, some four hundred (400) miles, owned by English capital and affectionately called the "Queen's Own." This is the strong line between the City of Mexico and Vera Cruz, a port rich in commerce and famous in history as the three times military base of a conquering foe,— the Spaniards in 1519, the Americans in 1847, and the French in 1862.

The Tehuantepec National Railway, one hundred and eighty-eight (188) miles long, running from the port of Salina Cruz, on the Pacific, to Coatzacoalcas, on the Gulf of Mexico, is owned by the Federal Government of Mexico, but is being operated for a term of years by S. Pearson's Sons Co., Limited, who constructed the splendid harbor and terminal facilities at both ends of this shortest of trans-continental lines. A portion of this road forms the connecting link

between the Vera Cruz to Isthmus (old Vera Cruz and Pacific) at Santa Lucrecia, and the Pan American at Picacho.

The remaining railway mileage of the Republic consists for the most part of small independent branch lines leading to mines and other industries, and in many cases is of narrow gauge.

It has been the good fortune of the writer to travel over every mile of main line and over numerous branch lines in the Republic of Mexico. While so doing, he has visited twenty-three of its twenty-seven States, and resided for a period at its capital, the wonderful and fascinating City of Mexico. For nearly two years past, with headquarters at Tucson, Arizona, U. S. A., he has served as the senior Vice-President of the Southern Pacific Railroad of Mexico and of the Arizona Eastern Railroad. The President of these lines, and their principal builder, is the distinguished engineer and railway executive, Mr. Epes Randolph.

In the twenty months since February, 1912, when the second of recent Mexican revolutions was started, the Southern Pacific of Mexico has been in full operation only six months. During the other fourteen months from ten per cent to eight per cent of its mileage has been out of commission at various times and in various places. At first the officials, who are all Americans, and the employees, who are nearly ninety per cent Mexicans, strained every nerve to crib bridges and to resume traffic. As time has worn on, however, all reserve energy has naturally been dissipated, the abnormal has become the normal, and the exceptional has lapsed into the routine. A train dispatcher is not startled if his wire suddenly goes down before the orders are completed. He knows from experience that the wire may not come up until perhaps to-morrow, next week, or mayhap next month or next year. Occasionally the attacking band will take possession of the locomotive and burn some or all of the cars in the train. Usually, however, in the course of a week or two the wire comes up and a conductor asks for running orders from an office many miles from where last located. Such primitive conditions have developed splendid initiative and resourcefulness on the part of officials and employees of all grades. From the President, who happened to be on the first train held up by armed force, down to the humblest laborer, all have followed Rule L of the standard code, reading: "In case of danger to the company's property, employees must unite to protect it." Ofttimes this has meant dauntless and unflinching exposure to rifle or cannon fire. Habitually, it has entailed inconvenience and physical hard-

ship. Officials who normally use comfortable business cars have taken to small motor cars, to track velocipedes, to push cars, or have traveled many miles on foot. On one occasion the writer's motor car was run by a man who had been a railroader, a frontier deputy marshal, and a chauffeur. For the particular trip in question he united the desirable qualities of a careful motorman, a crack shot, and a good cook. The first night was spent in a tool house, one night in a freight house, another in a waiting room, and still another in the open country. The car was towed around burned bridges through the arroyos (channels of dry streams).

On another trip a good-sized river had to be crossed, the long trestle approach to the steel bridge having been burned some weeks before. Visions of swimming the river like Funston in the Philippines were ended when the thoughtfulness of an Assistant Superintendent showed a section gang as water rats towing a raft made of ties. This interchangeability of function is typical of the all-round training inculcated on the Southern Pacific Railroad of Mexico by the unit system of organization. Two years of complete and consistent application of the underlying principles of this rational and practical system have produced gratifying results. To-day every department, including traffic and accounting, has available from one to three developed and tested understudies for every official position. Coincidentally during the only period of eight months when conditions approached normal, the operating ratio with normal maintenance charges fell from ninety-seven to seventy-eight per cent.

In May, 1912, after operation of the Sinaloa Division had been suspended for over three weeks, it was deemed advisable to move all obtainable equipment north to Empalme, Sonora, near Guaymas, where conditions were tranquil. There were only a dozen locomotives at division headquarters in Mazatlan, Sinaloa, two hundred and seventy-five (275) miles south of San Blas, Sinaloa, the north end of the division, and a total of some five hundred (500) cars within reach. It was feared that insurrectos might cripple the movement by burning bridges between trains. Not only did bridges have to be hurriedly cribbed, but water tanks had to be repaired, some having been riddled with bullets.

On Monday morning the procession started with a train order reading somewhat as follows: "All engines on division run extra to San Blas with right over all southbound trains until 10:00 P. M. Friday, May 10th, and protecting carefully against following trains."

Some sixty hours later the senior Vice-President, renewing his yardmaster days, tied up the last train on the main track, at San Blas, and then issued an order congratulating the Sinaloa Division, through its Superintendent, on a performance easy anywhere else, but most difficult under the circumstances.

Regular traffic was not resumed for several weeks. Meantime a "cruiser train" was put on. Passengers rode in the caboose. No cars were left at stations, but freight offered was loaded in empties in the train. After cruising all day, the train tied up wherever night overtook it. The danger of encountering a hole instead of a bridge precludes much night running in times like these.

On March 5, 1913, the State of Sonora revolted against the newly established Huerta government, and seized that portion of the Southern Pacific Railroad of Mexico lying north of Empalme. For six weeks the officials of the road were powerless. Operation was carried on from Hermosillo, the capital of the State of Sonora, by the State officials, with six locomotives and other equipment forcibly seized. Methods of alleged confiscation of railway property in the United States are perhaps crude after all. Six weeks of such operation gave the State officials their fill. Outgo so exceeded income that the road was unconditionally returned to its owners.

It is not the mission of this paper to discuss the political, economic, and military conditions in Mexico, or to venture into the realm of conjecture as to probable outcome. Its main purpose is to record an appreciation of sustained performance, both creditable to the many individuals concerned and so consistent with those high ideals of duty which are characteristic of red-blooded railroad men the world over.

THE MAN WHO DARE NOT MAKE MISTAKES

BY F. E. SMALL.*

The least known man in American railroad work — and at the same time the man occupying the most responsible position in the railroad service — is the train dispatcher. Probably about one person in a thousand knows that there is such an official, and about one in ten thousand knows what his duties and responsibilities really are. This article is intended to introduce to you the train dispatcher and explain briefly a few of his many responsibilities.

All of us have heard of railroad presidents, and the most of us know of the general manager, the general superintendent, and the division superintendent, who are the operating department officials directly under the president of the railroad and ranking in the order named.

The division superintendent is the man at the head of the division organization, and under him are a large number of officials and employees, each with his particular line of work — the engineering men, the motive power men, and the maintenance of way men — but the division superintendent's "right-hand man" is the chief train dispatcher, who, by virtue of his position, shapes the policies of the division more than any other one man.

He it is to whom every man on the entire railroad system looks for all information. Train movements of every kind are made under his instructions, and he must at all times know where each engine and car and each train and engine crew on his division is at every minute of the twenty-four hours of the day. He must figure far ahead so he will have sufficient engines and crews always on hand, at the proper times, at the many different division points and important junctions on his division, to handle passenger and freight trains which are reported to arrive there. The chief dispatchers of connecting divisions advise him by telegraph, at frequent intervals during the day and night, of the probable arriving time of passenger trains and of trains of live stock, perishable and merchandise freight, and other commodities at the point of exchange between the different railroads or between two divisions of the same railroad.

* In the Santa Fe Magazine.

The chief dispatcher, having arranged for sufficient engines and crews to move all the passenger and freight trains in sight, the actual moving of all this business is then worked out by the train dispatcher. A dispatching district averages about one hundred and twenty-five miles of single track railroad. Where business is heavy it is frequently less than this. On each dispatching district are three train dispatchers, each working eight hours, thus covering the twenty-four hours.

These men are selected with great care from the ranks of the telegraph operators, it having been, until the last few years, almost absolutely necessary that the train dispatcher be an expert telegrapher. Now, however, the telephone is used extensively for train handling, with excellent results, and we can expect to see promoted to these positions many men from the train service.

The train dispatcher must be a man with executive ability, for he must direct the work of every employee upon his district. He must thoroughly understand every line of railroad work, for men in every form of work call upon him for instructions and advice during every minute of his time on duty. He must be well posted on the wants and needs of the public, as much of the advice given by him to agents and operators along the line is for the information of the public. He must be thoroughly posted on federal and state laws covering the hours that certain employees may work and the laws governing the movement of trains and of certain classes of freight, such as live stock and explosives, as well as local ordinances passed by many cities and towns, any violation of which may subject the railroad company to a heavy fine.

Above all, the train dispatcher must have a clear head and an active brain, with the ability to decide quickly and correctly the many difficult problems that he must solve every hour that he is on duty, for he cannot take a matter "under advisement" and render a decision later; trains must be kept moving, and the proper decision must be made **at once**, and it must be an absolutely correct solution or traffic may be delayed, resulting in financial loss to the railroad company and complaints from the public.

There are federal laws, such as the hours of service law, which prescribe that train and engine crews shall not be on duty in excess of sixteen hours in the aggregate in any twenty-four-hour period; that telegraph or telephone operators handling and delivering the train dispatchers' orders to trains shall not work in excess of thirteen hours a day at stations where but one man is employed, or more

than nine hours a day at stations where two or more operators are employed; laws governing the movement of live stock, which makes twenty-eight hours the limit of time that cattle, horses, sheep, and other stock can be kept upon the cars without being unloaded for feeding and resting, except that the party who accompanies each shipment of live stock may, if he so desires, sign a thirty-six-hour release, and, this having been done, the stock may be kept upon the cars for thirty-six hours before unloading. All these and many more laws have to be kept continually in mind by the train dispatcher, and it is a part of his duty to see that none is violated by the men upon his district.

So much for the qualifications necessary for the making of a good train dispatcher. We shall now see how he performs the most exacting and responsible duties that can be crowded upon the shoulders of any one man. The train dispatcher's word is **law**; his instructions are obeyed to the letter, for to deviate from them in the least is to invite disaster. He is the man who tells the train and engine crews when to start their trains, and when to place them on sidetracks to meet or be passed by other trains. He is the man who is doing the thinking for two hundred men and directing the movements of twenty or thirty and oftentimes more trains at the same time.

The train crews know of the location of but one train — their own — while the train dispatcher must know the location of them all and keep them moving without accident or delay, oftentimes a very difficult thing to do upon a busy single track railroad, yet it is being done hour after hour and day after day on the railroads of the United States, Canada, and Mexico by this almost unknown man, the train dispatcher — this man who holds the lives of every railroad passenger and employee in the hollow of his hand, whose slightest error (which seldom occurs) may result in the sacrifice of many human lives and the loss of property valued at thousands of dollars.

The train dispatcher's office is located in as quiet a part of the office building as possible, where he will not be disturbed at a critical moment. He has upon his desk for his exclusive use a telegraph or telephone circuit connecting him with every station upon the district over which he directs the movements of trains. This wire, known as the dispatcher's wire, or train wire, is used exclusively for train orders, messages in regard to trains, and for conversation between the train dispatcher and his men out on the road. During the entire twenty-four hours, day and night, a train dispatcher is always at this desk, one man leaving only when he has made a transfer in

writing to his relief, stating what train orders are outstanding, giving the location of every train and engine upon the district, and calling attention to all matters of importance.

A copy of every train order issued is kept in the train dispatcher's order book. A complete record of every train or engine run on the district is kept on a large train sheet, a new one being started at midnight of each day. This train sheet is a large piece of heavy white paper nearly two feet wide and from four to six or seven feet in length, divided into vertical spaces about one inch in width, in which is kept the time the trains pass every station, each one of the vertical columns representing a train. Lighter horizontal lines, each representing a station, are drawn across the sheet. In the middle vertical column is printed the name of every station and sidetrack on the train dispatcher's district, one below the other, each station or siding name coming on one of the horizontal lines and showing also the distances between each siding and how many cars can be placed upon each. At the top of each vertical column are spaces in which the train dispatcher writes the train number, engine number, names of conductor and engineer, number of loaded and of empty cars in the train, the weight of the train in tons, the time the crews were called to go on duty, and information regarding perishable freight and live stock in freight trains. At other places on the sheet are spaces for the train dispatchers to sign their names, showing the hours each has worked, and for information regarding weather conditions and explanations of delays to trains.

Very nearly all the passenger trains and a few of the more important freight trains are represented on the timetable furnished to all employees. This timetable contains the train number and the time the train of that number should pass every siding on the district, and, on single track railroads, the timetable designates the siding at which each train will **meet** an opposing train, **provided each train is on time.**

If every train were to run on time and never met with delays that would prevent it from reaching these scheduled meeting points at the time specified, and if no trains were to be run except those shown on the timetable, the train dispatcher would have very little to do, but trains do meet with delays on the road, or a connecting line delivers the train late to one district, and it is then necessary for the train dispatcher to figure out a new meeting point between the delayed trains and every other train on his district. To do this he must know just how fast each train will travel, what part of the railroad is

up hill for this train and down hill for another, and the degree of ascending grade and curvature, all of which figure in his calculations

When the train dispatcher has decided where, for instance, trains No. 1 and No. 2 should meet, he telegraphs the following order to telegraph offices on either side of the new meeting point. The telegraph operator receiving the order displays a red train order signal to notify the trains concerned that he has an order for them, then copies the order as it is sent to him on the wire by the train dispatcher, afterward repeating it to the dispatcher so that official may know it has been correctly received:

No. 1 engine 2131 will meet No. 2 engine 2242 at Smithville.

The engineers of these trains, upon approaching the stations where the train order is awaiting them, discover the signal notifying them to stop, and then receive the order which the conductors sign for. Both conductors and engineers receive a copy.

If afterward the operator's reports of the time that train No. 1 passes certain stations show that this train has again been delayed, the train dispatcher issues another order, as follows:

No. 1 engine 2131 will meet No. 2 engine 2242 at Thompson instead of Smithville.

It is absolutely necessary that the train dispatcher watch his trains very closely; that is, secure frequent advice from the operators along the line of the time trains pass each station, to know where they are at all times, that the proper station may be designated as the meeting point.

The greater part of the freight trains run are "extras," and the only rights they have are those given them by the train dispatcher. In starting one of these extra trains on its trip across the district, an order such as the following is issued:

Engine 3521 will run extra Smithville to Walnut, will meet Extra 3514 west at Thompson, meet Extra 3532 west at Pomona, and meet No. 21 engine 2240 at Summit.

In the case of these meeting points, made between extra trains moving in opposite directions on single tracks, the crews of none of the extras mentioned knew of the other extra coming toward them until they received the train order instructing them where the meeting point would be, and had the train dispatcher failed so to notify them the result might have been disastrous.

In the handling of a very important special passenger train, such, for instance, as a train occupied by the president of the United States,

the special receives its instructions to run upon a "schedule order" like the following:

Engine 3420 will run passenger extra, leaving Great Falls on Saturday, March 21, as follows, with right over all trains:

Leave	Great Falls	eight thirty	8:30 A. M.
	Cascade	nine ten	9:10 A. M.
	Wolf Creek	ten five	10:05 A. M.
	Silver	ten fifty	10:50 A. M.
Arrive	Helena	eleven ten	11:10 A. M.

After issuing an order of this kind, which must be addressed to the crews of every train upon the district, the train dispatcher carefully checks his order book and the signatures sent him by telegraph, which are the acknowledgments of the conductors and engineers of the trains on the road that they have received the order and understand it. The train dispatcher must be sure, **very sure**, that every train upon his district has received a copy of this order before he can allow the special passenger train to start. The book of rules provides that the regular and extra trains upon the district may proceed as far as they can, keeping close check upon the time that the special is due at certain stations, and place their trains upon some side track at least five minutes before the special is due to pass that point.

The rules governing the movement of trains under the orders of the train dispatcher are very plain, and railroad officials are very careful in instructing and examining trainmen and enginemen so that all may have the same understanding of them.

The vast army of American railroad employees is composed of the most intelligent and best trained men in the world to-day, whose dangers are many and whose mistakes are few. Rigid rules governing these train movements, together with carefully planned instructions issued by the train dispatcher and executed by this army of trained employees, make our American railroads the safest of any in the world for the traveler, carrying thousands and thousands of passengers yearly with very few accidents and making a much better showing in this respect than the European railroads, whose trains are not operated by means of telegraphic orders from a train dispatcher, as are the trains of the United States, Canada, and Mexico, but by manual block systems, controlled, in many cases, by women and children.

The American train dispatcher is, as near as it is possible for a human being to be, a "mistakeless" man.

RAIL PRODUCTION IN THE UNITED STATES IN 1913

From Special Bulletin of the Bureau of Statistics of the American Iron and Steel Institute.

The production of all kinds of rails in 1913 amounted to 3,502,780 tons, against 3,327,915 tons in 1912, an increase of 174,865 tons, or over 5.2 per cent. Included in the total for 1913 are 195,659 tons of girder and high T steel rails for electric and street railways, against 174,004 tons in 1912 and 205,409 tons in 1911. The maximum production of all kinds of rails was reached in 1906, when 3,977,887 tons were rolled, or 475,107 tons more than were produced in 1913.

Of the total production of rails in 1913, 3,303,944 tons were rolled from open-hearth, Bessemer, and electric steel blooms or billets, against 3,165,939 tons in 1912; 43,793 tons were rolled from new seconds, defective new rails, and steel crop ends, against 42,586 tons in 1912; and 155,043 tons were rerolled from old steel rails or were renewed steel rails, against 119,390 tons in 1912. No iron rails were reported for 1912 or 1913. In the following table the production of all kinds of rails in 1913 is given by states.

States—Gross tons. All kinds of rails.	Open-hearth rails. Gross tons.	Bessemer rails. Gross tons.	Electric, renewed, and rerolled old steel rails.	Total Gross tons.
New York, New Jersey, and Md.	416,212	202,329	35,666	654,207
Pennsylvania.	618,795	326,819	26,206	971,820
West Virginia, Alabama, and Ohio.	632,858	.....	25,054	657,912
Ind., Ill., Wis., Kan., Col., and Wash..	859,845	288,443	70,553	1,218,841
Total for 1913.	2,527,710	817,591	157,479	3,502,780
Total for 1912.	2,105,144	1,099,926	122,845	3,327,915

As shown above the production of open-hearth rails in 1913 more than tripled the output of Bessemer rails.

Included in the 157,479 tons of rails rolled in 1913 and classified as electric and rerolled steel are 2,436 tons of rails rolled from electric steel and 155,043 tons of renewed rails or rails rolled from old steel rails which the makers were unable to classify as open-hearth or Bessemer. In 1912 there were 3,455 tons of rails rolled from elec-

tric steel and 119,390 tons rolled from old steel rails or from renewed rails. Twenty-five works in 13 states rolled or rerolled rails in 1913, as compared with 24 works in 12 states in 1912.

The production of all kinds of rails by states is given in the following table from 1910 to 1913, in gross tons.

States—Gross tons. All kinds of rails.	1910.	1911.	1912.	1913.
New York, New Jersey, and Md.	711,975	490,980	585,817	654,207
Pennsylvania	986,702	839,663	888,672	971,820
West Virginia, Alabama, and Ohio	496,716	447,905	622,121	657,912
Ind., Ill., Wis., Kan., Col., Wash., Cal.	1,440,638	1,044,242	1,231,305	1,218,841
Total	3,636,031	2,822,790	3,327,915	3,502,780

PRODUCTION OF OPEN-HEARTH STEEL RAILS.

The production of open-hearth steel rails in 1913 amounted to 2,527,710 tons, against 2,105,144 tons in 1912, an increase of 422,566 tons, or over 20 per cent. Of the total in 1913, 2,514,658 tons were rolled from ingots and 13,052 tons were rolled from new seconds, defective new rails, crop ends, etc. Almost all were rolled from basic steel. The maximum production of open-hearth rails was reached in 1913. The year of next largest production was 1912.

The following table gives the production of acid and basic open-hearth rails by states from 1908 to 1913, in gross tons.

States—Gross tons.	1908.	1909.	1910.	1911.	1912.	1913.
N. Y., N. J., and Pa.	184,059	335,856	445,139	579,924	712,056	924,445
Md., Ala., and Ohio	251,956	344,842	570,878	509,950	600,113	743,420
Ind., Ill., Wis., Col., and California	135,776	575,976	735,342	587,049	792,975	859,845
Total	571,791	1,256,674	1,751,359	1,676,923	2,105,144	2,527,710

There were 15 works in 9 states in 1913 which produced open-hearth rails, as follows: New York, 1; Pennsylvania, 5; Maryland, 1; Alabama, 2; Ohio, 2; Indiana, 1; Illinois, 1; Wisconsin, 1; and Colorado, 1; against 16 works in 9 States in 1912. Pennsylvania was the largest maker of open-hearth rails in 1911, 1912, and 1913. It also rolled more open-hearth rails than Bessemer rails in these three years, its production of open-hearth rails in 1913 exceeding its production of Bessemer rails by 291,976 tons and in 1912 by 182,918 tons. In 1909 and 1910 Indiana was the largest maker of open-hearth rails but in 1907 and 1908 Alabama was the largest maker of rails of this kind.

PRODUCTION OF BESSEMER STEEL RAILS.

The production of Bessemer steel rails in 1913 amounted to 817,591 tons, against 1,099,926 tons in 1912, a decrease of 282,335 tons, or over 25.6 per cent. Of the total in 1913, 786,850 tons were rolled from ingots and 30,741 tons were rolled from new seconds, defective new rails, crop ends, etc. Pennsylvania was the largest maker of Bessemer rails in 1913, but Illinois was the largest maker in 1908, 1909, 1910, 1911, and 1912. The maximum production of Bessemer rails was reached in 1906, when 3,791,459 tons were produced. Bessemer rails were rolled by 8 works in 5 states in 1913, against 10 works in 7 states in 1912.

The following table gives the production of Bessemer steel rails by states from 1908 to 1913, in gross tons.

States.	1908.	1909.	1910.	1911.	1912.	1913.
N. Y., N. J., and Md.....	386,730	586,193	568,353	284,230	367,128	202,329
Pennsylvania.....	315,547	553,719	591,473	352,331	343,837	326,819
West Va., Ala., Ohio, Ind., and Ill.....	576,040	627,259	724,616	416,859	388,961	288,443
Wis., Col., Cal., and Wash.....	70,836					
Total.....	1,349,153	1,767,171	1,884,442	1,053,420	1,099,926	817,591

PRODUCTION OF ELECTRIC STEEL RAILS.

In 1913 the production of rails rolled from steel made in electric furnaces amounted to 2,436 tons, as compared with 3,455 tons in 1912 and 462 tons in 1911. In 1909 and 1910 small quantities of rails were also rolled from electric steel, but these rails were included with the Bessemer and open-hearth rails reported for these two years.

PRODUCTION OF REROLLED OR RENEWED STEEL RAILS.

In 1913 the production of steel rails rolled from new seconds, defective new rails, crop ends, old steel rails, etc., including renewed rails, amounted to 198,836 tons, against 161,976 tons in 1912. Of the total in 1913, 43,793 tons were rolled from new seconds, etc., against 42,586 in 1912, and 155,043 tons were renewed rails or were rerolled from old steel rails, against 119,390 tons in 1912.

Of the 43,793 tons rolled from new seconds in 1913, 30,741 tons were rolled from Bessemer steel and 13,052 tons from open-hearth steel, against 29,446 tons rolled from Bessemer steel and 13,140 tons rolled from open-hearth steel in 1912. The tonnage rolled from new

seconds, etc., for the two years is therefore included in the Bessemer and open-hearth steel rails reported for these years.

But, as the 155,043 tons of rails rerolled from old steel rails and renewed rails in 1913, and the 119,390 tons of rails of the same kind rolled in 1912, could not be classified by the manufacturers as open-hearth or Bessemer rails, they are not included in the Bessemer or open-hearth output for the two years, but are grouped under the general heading of rerolled steel rails. Prior to 1911 all rails of this class are included with Bessemer or open-hearth steel rails.

PRODUCTION OF IRON RAILS.

No iron rails were rolled in 1912 or 1913. In 1911 the production was 234 tons, all rolled in Illinois, and all weighing less than 45 pounds to the yard, against 230 tons in 1910.

WEIGHT PER YARD OF ALL KINDS OF RAILS.

In 1913 nearly 29.9 per cent of the rails weighing less than 50 pounds to the yard, nearly 48.7 per cent of the rails weighing 50 pounds and less than 85 pounds, and over 87.2 per cent of the rails weighing 85 pounds and over were rolled from open-hearth steel, while in the same year nearly 41 per cent of the rails weighing less than 50 pounds to the yard, over 44.8 per cent of the rails weighing 50 pounds and less than 85 pounds, and nearly 12.1 per cent of the rails weighing 85 pounds and over were rolled from Bessemer steel. In addition, in 1913 over 29.1 per cent of the rails weighing less than 50 pounds to the yard, over 6.5 per cent of the rails weighing 50 pounds and less than 85 pounds, and less than 1 per cent of the rails weighing 85 pounds and over were rolled from electric ingots and old steel rails or were renewed rails.

The following table gives the production of all kinds of rails in 1913, classified according to their weight per yard.

Kinds of rails—Gross tons.	Under 50 pounds.	50 pounds and less than 85.	85 pounds and over.	Total. Gross tons.
Open-hearth steel rails.....	80,761	470,810	1,976,139	2,527,710
Bessemer steel rails.....	110,795	433,372	273,424	817,591
Other steel rails.....	78,793	63,100	13,150	155,043
Electric steel rails.....	56	31	2,349	2,436
Iron rails.....	None.	None.	None.	None.
Total.....	270,405	967,313	2,265,062	3,502,780

WEIGHT OF ALL KINDS OF RAILS FROM 1897 TO 1913.

The following table gives the production of all kinds of rails from 1897 to 1913, according to the weight of the rails per yard. As shown below, the rail classification by weight per yard was slightly changed in 1913.

Years—Gross tons.	Under 45 pounds per yard.	45 pounds and less than 85.	85 pounds and over per yard.	Total. Gross tons.
1897.....	88,896	1,223,435	335,561	1,647,892
1898.....	123,881	1,404,150	453,210	1,981,241
1899.....	133,836	1,559,340	579,524	2,272,700
1900.....	157,531	1,626,093	602,058	2,385,682
1901.....	155,406	2,225,411	493,822	2,874,639
1902.....	261,887	2,040,884	645,162	2,947,933
1903.....	221,262	1,603,088	1,168,127	2,292,477
1904.....	291,883	1,320,677	672,151	2,284,711
1905.....	228,252	1,601,624	1,546,053	3,375,929
1906.....	284,612	1,749,650	1,943,625	3,977,887
1907.....	295,838	1,569,985	1,767,831	3,633,654
1908.....	183,869	687,632	1,049,514	1,921,015
1909.....	255,726	1,024,856	1,743,263	3,023,845
1910.....	260,709	1,275,339	2,099,983	3,636,031
1911.....	218,758	1,067,696	1,536,336	2,822,790
1912.....	248,672	1,118,592	1,960,651	3,327,915
1913.....	*270,405	†967,313	2,265,062	3,502,780

*Include rails under 50 pounds. † Include 50 pounds and less than 85 pounds.

Girder and high T steel rails for electric and street railways are included in the total. As already stated, the maximum production of all kinds of rails was reached in 1906. The year of next largest output was 1910.

PRODUCTION OF ALL KINDS OF RAILS BY PROCESSES.

In the following table the production of all kinds of rails from 1897 to 1913 is given by processes, in gross tons of 2,240 pounds. Of the total production in 1913 about 72.16 per cent was rolled from open-hearth steel, about 23.34 per cent from Bessemer steel, and about 4.50 per cent from electric steel, old steel rails, and renewed rails.

Years. Rails.	Open-hearth steel.	Bessemer steel.	Rerolled steel.	Electric steel.	Iron.	Total.
1897.....	500	1,644,520	Included with Bessemer and open-hearth steel rails from 1897 to 1910 inclusive.	....	2,872	1,647,892
1898.....	1,220	1,976,702		....	3,319	1,981,241
1899.....	523	2,270,585		....	1,592	2,272,700
1900.....	1,333	2,383,654		....	695	2,385,682
1901.....	2,093	2,870,816		....	1,730	2,874,639
1902.....	6,029	2,935,392		....	6,512	2,947,933
1903.....	45,054	2,946,756		....	667	2,992,477
1904.....	145,883	2,137,957		....	871	2,284,711
1905.....	183,264	3,192,347		....	318	3,375,929
1906.....	186,413	3,791,459		....	15	3,977,887
1907.....	252,704	3,380,025		....	925	3,633,654
1908.....	571,791	1,349,153		.....	71	1,921,015
1909.....	1,256,674	1,767,171		†	....	3,023,845
1910.....	1,751,359	1,884,442		†	230	3,636,031
1911.....	1,676,923	1,053,420	*91,751	462	234	2,822,790
1912.....	2,105,144	1,099,926	*119,390	3,455	....	3,327,915
1913.....	2,527,710	817,591	*155,043	2,436	....	3,502,780

*Rerolled from old steel rails and renewed rails which the manufacturers could not classify as Bessemer or open-hearth. † Small tonnages rolled in 1909 and 1910 but included with Bessemer and open-hearth rails for these years.

PRODUCTION OF ALLOY STEEL RAILS.

Included in the 3,502,780 tons of steel rails rolled in 1913 are 59,519 tons of rails rolled from alloy-treated steel, as compared with 149,267 tons in 1912.

The following table gives the production by processes of alloy-treated steel rails since 1909, in gross tons.

Alloy rails—Gross tons.	Open-hearth and electric.	Bessemer.	Total.
Titanium steel rails.....	30,653	17,002	47,655
Manganese, copper, and nickel.....	2,914	8,950	11,864
Total for 1913.....	33,567	25,952	59,519
Total for 1912.....	40,393	108,874	149,267
Total for 1911.....	38,539	115,450	153,989
Total for 1910.....	27,389	229,935	257,324
Total for 1909.....	13,696	35,699	49,395

The following table gives the production of rails rolled from alloy-treated steel by weight per yard from 1909 to 1913. As already stated, the rail classification by weight per yard was slightly changed in 1913. Gross tons are used.

Alloy rails—Gross tons.	Under 45 pounds.	45 pounds and less than 85.	85 pounds and over.	Total.
Titanium steel rails.....	75	9,017	38,563	47,655
Mang., copper, and nickel.....	16	397	11,451	11,864
Total for 1913.....	*91	†9,414	50,014	59,519
Total for 1912.....	21	5,426	143,820	149,267
Total for 1911.....	....	27,097	126,892	153,989
Total for 1910.....	....	70,170	187,154	257,324
Total for 1909.....	....	9,132	40,263	49,395

* Include rails under 50 pounds. † Include 50 pounds and less than 85 pounds.

The following table gives the output by States since 1909 of rails rolled from alloy-treated steel, in gross tons.

Alloy rails—Gross tons.	1909.	1910.	1911.	1912.	1913.
New York, N. J., & Penna.....	46,759	191,265	91,304	54,767	11,107
Md., Ohio, Ind., and Ill.....	2,636	66,059	62,685	94,500	48,412
Total.....	49,395	257,324	153,989	149,267	59,519

The following table gives the output by kinds since 1909 of rails rolled from alloy-treated steel, in gross tons.

Alloy rails—Gross tons.	1909.	1910.	1911.	1912.	1913.
Titanium steel rails.....	35,945	256,759	152,990	141,773	47,655
Mang., cop., nickel, etc.....	13,450	565	999	7,494	11,864
Total.....	49,395	257,324	153,989	149,267	59,519

IMPORTS AND EXPORTS OF RAILS.

The following table gives our exports of steel rails to all countries during the last five calendar years, in gross tons. Our imports of steel rails in 1913 amounted to 10,408 gross tons, as compared with 3,780 gross tons in 1912.

Countries—Calendar years.	1909.	1910.	1911.	1912.	1913.
Canada.....	32,988	25,341	88,047	133,351	161,971
Cent. America and Brit. Hond.....	22,749	17,927	14,839	15,935	12,418
Mexico.....	65,838	63,082	35,152	32,402	13,907
West Indies and Bermuda.....	26,981	41,029	35,892	47,889	32,954
Argentina.....	101,943	64,370	57,385	13,574	41,181
Brazil.....		18,400	28,601	45,951	41,215
Other South America.....		16,384	41,596	54,465	33,525
Japan.....		17,977	49,775	54,247	20,820
Other Asia and Oceanica.....	38,325	80,080	57,550	31,387	90,405
Other countries.....	893	8,590	12,037	17,272	12,157
Total.....	299,540	353,180	420,874	446,473	460,553

PRODUCTION AND CONSUMPTION OF RAILS FOR 40 YEARS.

The annual consumption of rails in the United States is approximately ascertained by adding the quantity imported to the total production and deducting the quantity exported. The following table gives the consumption since 1874.

Years. Gross tons.	Production—Gross tons.			Add imports.	Deduct exports.	Approximate consumption
	Iron.	Steel.	Total.			
1874.....	521,848	129,414	651,262	96,706	1,122	746,846
1875.....	447,901	259,699	707,600	17,364	1,080	723,884
1876.....	417,114	368,269	785,383	256	3,180	782,459
1877.....	296,911	385,865	682,776	31	6,647	676,160
1878.....	288,295	499,817	788,112	9	8,354	779,767
1879.....	375,143	618,850	993,993	39,417	3,066	1,030,344
1880.....	440,859	864,353	1,305,212	259,543	958	1,563,797
1881.....	436,233	1,210,285	1,646,518	344,929	611	1,990,836
1882.....	203,459	1,304,392	1,507,851	200,113	3,220	1,704,744
1883.....	57,994	1,156,911	1,214,905	34,801	2,308	1,247,398
1884.....	22,821	999,367	1,022,188	2,829	6,034	1,018,983
1885.....	13,228	963,750	976,978	2,189	7,757	971,410
1886.....	21,142	1,579,395	1,600,537	41,587	2,644	1,639,480
1887.....	20,591	2,119,049	2,139,640	137,830	549	2,276,921
1888.....	12,725	1,390,975	1,403,700	63,037	6,908	1,559,829
1889.....	9,159	1,513,045	1,522,204	6,217	9,325	1,519,096
1890.....	13,882	1,871,425	1,885,307	204	16,947	1,868,564
1891.....	8,240	1,298,936	1,307,176	253	11,239	1,296,190
1892.....	10,437	1,541,407	1,551,844	347	7,982	1,544,209
1893.....	6,090	1,130,368	1,136,458	2,888	19,876	1,119,470
1894.....	4,674	1,017,098	1,021,772	300	13,556	1,008,516
1895.....	5,810	1,300,325	1,306,135	1,447	15,599	1,291,983
1896.....	4,347	1,117,663	1,122,010	7,796	73,131	1,056,675
1897.....	2,872	1,645,020	1,647,892	415	148,221	1,500,086
1898.....	3,319	1,977,922	1,981,241	200	301,903	1,679,538
1899.....	1,592	2,271,108	2,272,700	2,134	277,714	1,997,120
1900.....	695	2,384,987	2,385,682	1,448	361,619	2,025,511
1901.....	1,730	2,872,909	2,874,639	1,905	318,956	2,557,588
1902.....	6,512	2,941,421	2,947,933	63,522	67,666	2,943,789
1903.....	667	2,991,810	2,992,477	95,555	30,837	3,057,195
1904.....	871	2,283,840	2,284,711	37,776	416,250	1,906,237
1905.....	318	3,375,611	3,375,929	17,278	295,023	3,098,184
1906.....	15	3,977,872	3,977,887	4,943	328,036	3,654,794
1907.....	925	3,632,729	3,633,654	3,752	338,906	3,298,500
1908.....	71	1,920,944	1,921,015	1,719	196,510	1,726,224
1909.....	.....	3,023,845	3,023,845	1,542	299,540	2,725,847
1910.....	230	3,635,801	3,636,031	7,861	353,180	3,290,712
1911.....	234	2,822,556	2,822,790	3,424	420,874	2,405,330
1912.....	.....	3,327,915	3,327,915	3,780	446,473	2,885,222
1913.....	.....	3,502,780	3,502,780	10,408	460,553	3,052,635

ANNUAL MILEAGE OF NEW STEAM RAILROAD.

The following table gives the length of new steam railroad constructed in the United States from 1880 to 1913, double tracks and sidings not considered. The figures are taken from *Poor's Manual* and the *Railway Age Gazette*.

Years.	Miles.	Years.	Miles.	Years.	Miles.	Years.	Miles.
1880	7,174	1889	5,700	1898	3,199	1907	5,499
1881	9,779	1890	5,657	1899	4,513	1908	3,654
1882	11,599	1891	4,620	1900	4,157	1909	3,476
1883	6,819	1892	4,584	1901	4,912	1910	3,918
1884	3,974	1893	2,789	1902	5,076	1911	3,293
1885	3,131	1894	2,264	1903	4,675	1912	2,997
1886	8,128	1895	1,938	1904	5,003	1913	3,071
1887	12,984	1896	2,068	1905	5,050	....	....
1888	7,066	1897	2,161	1906	5,643	....	....

In addition to the new main line track laid in 1913 the *Railway Age Gazette* says there were 1,396 miles of second, third, fourth, or more tracks laid in the same year, as compared with 1,215 miles of similar track laid in 1912. Yard and siding track are not included for either year.

PRODUCTION AND PRICES OF BESSEMER STEEL RAILS IN THE UNITED STATES SINCE 1867.

The following table gives the production of Bessemer steel rails in the United States since 1867 and their average annual price at works in Pennsylvania. Prices are in currency.

Years.	Gross tons.	Price	Duty.
1867.....	2,277	\$166.00	45 per cent ad valorem to January 1, 1871.
1868.....	6,451	158.46	
1869.....	8,616	132.19	
1870.....	30,357	106.79	
1871.....	34,152	102.52	
1872.....	83,991	111.94	\$28 per ton from January 1, 1871 to August 1, 1872; \$25.20 from August 1, 1872, to March 3, 1875; \$28 from March 3, 1875, to July 1, 1883.
1873.....	115,192	120.58	
1874.....	129,414	94.28	
1875.....	259,699	68.75	
1876.....	368,269	59.25	
1877.....	385,865	45.58	
1878.....	491,427	42.21	
1879.....	610,682	48.21	
1880.....	852,196	67.52	
1881.....	1,187,770	61.08	
1882.....	1,284,067	48.50	\$17 per ton from July 1, 1883, to October 6, 1890.
1883.....	1,148,709	37.75	
1884.....	996,983	30.75	
1885.....	959,471	28.52	
1886.....	1,574,703	34.52	
1887.....	2,101,904	37.08	\$13.44 per ton from October 6, 1890, to August 28, 1894.
1888.....	1,386,277	29.83	
1889.....	1,510,057	29.25	
1890.....	1,867,837	31.78	
1891.....	1,293,053	29.92	
1892.....	1,537,588	30.00	
1893.....	1,129,400	28.12	
1894.....	1,016,013	24.00	
1895.....	1,299,628	24.33	
1896.....	1,116,958	28.00	
1897.....	1,644,520	18.75	\$7.84 per ton from August 28, 1894, to August 6, 1909.
1898.....	1,976,702	17.62	
1899.....	2,270,585	28.12	
1900.....	2,383,654	32.29	
1901.....	2,870,816	27.33	
1902.....	2,935,392	28.00	
1903.....	2,946,756	28.00	
1904.....	2,137,957	28.00	
1905.....	3,192,347	28.00	
1906.....	3,791,459	28.00	
1907.....	3,380,025	28.00	\$3.92 per ton from August 6, 1909, to October 4, 1913.
1908.....	1,349,153	28.00	
1909.....	1,767,171	28.00	
1910.....	1,884,442	28.00	
1911.....	1,053,420	28.00	
1912.....	1,099,926	28.00	Free on and after October 4, 1913.
1913.....	817,591	28.00	

MILES OF IRON AND STEEL RAILS IN THE UNITED STATES.

The following table from *Poor's Manual* gives the miles of steam railroad track in this country from 1880 to 1909 which had been laid with steel rails or iron rails. Similar details for succeeding years were not compiled by Poor.

Calendar years.	Miles of steel rails.	Miles of iron rails.	Total miles.	Annual increase.	Percentage of steel rails.
1880.....	33,680	81,967	115,647	.....	29.1
1881.....	48,984	81,471	130,455	14,808	37.5
1882.....	66,611	74,267	140,878	10,423	47.3
1883.....	78,411	70,690	149,101	8,223	52.6
1884.....	90,162	66,252	156,414	7,313	57.6
1885.....	98,013	62,493	160,506	4,092	61.0
1886.....	105,630	62,322	167,952	7,446	62.9
1887.....	125,349	59,586	184,935	16,983	67.8
1888.....	138,395	52,981	191,376	6,441	72.3
1889.....	151,578	50,510	202,088	10,712	75.0
1890.....	167,458	40,694	208,152	6,064	80.4
1891.....	174,775	39,754	214,529	6,377	81.5
1892.....	182,711	38,918	221,629	7,100	82.4
1893.....	190,718	37,135	227,853	6,224	83.7
1894.....	197,491	35,264	232,755	4,902	84.8
1895.....	206,381	28,650	235,031	2,276	87.8
1896.....	210,290	28,440	238,730	3,699	88.1
1897.....	215,658	26,043	241,701	2,971	89.2
1898.....	220,804	24,435	245,239	3,538	90.0
1899.....	228,976	21,387	250,363	5,124	91.5
1900.....	238,464	19,389	257,853	7,490	92.4
1901.....	246,811	19,181	265,992	8,139	92.7
1902.....	257,437	17,398	274,835	8,843	93.6
1903.....	271,013	15,249	286,262	11,427	94.6
1904.....	282,229	11,708	293,937	7,675	96.0
1905.....	289,109	10,803	299,912	5,975	96.3
1906.....	303,335	9,624	312,959	13,047	96.8
1907.....	314,713	9,320	324,033	11,074	97.1
1908.....	324,806	8,970	333,776	9,743	97.3
1909.....	334,525	8,862	343,387	9,611	97.7
1910.....	.....	.....	349,870	6,483	....
1911.....	.....	.....	359,030	9,160	....

SOME TENDENCIES OF THE TIMES

BY G. F. SWAIN,

President American Society of Civil Engineers.*

One of the most serious tendencies of the present day, particularly in the United States, a tendency which, like the disregard of authority, seems to result from that to regard men as equal, is the disregard for experience. It is a tendency fraught with great possibilities for evil, which must be recognized by every serious thinker.

In any occupation, except those which have to do with the study of purely abstract relations, which, as above explained, may be arrived at correctly in the seclusion of the study, it is almost self-evident that experience is of great value. In any occupation having to do with pure or applied science, and particularly in those having to do with man and his relations to society — that is to say, in politics, economics and government, as well as in engineering — experience is a necessary qualification for arriving at correct judgments. A person having a power of perception of mathematical relations may become a profound mathematician at an early age; indeed, the perception of mathematical truths is essentially a subjective faculty, and may be most correct and powerful when the mind is removed from the objective state. Some mathematical prodigies have reached their greatest power when mere boys, and have lost it with increasing age and contact with the objective world. In business affairs, however, no amount of reading of books or of closest meditation can take the place of actual experience; but, if all men are equal, then the boy's opinion is as good as the man's, and experience is a mere useless drag.

It seems to be an inherent tendency of our form of government to disregard the value of experience; any man is considered good for any job; all he has to do is to get the votes, by one means or another. Men who have made little or no study of government, and who have had no experience in it, are considered capable of judging of and administering laws, and of occupying any elective or appointive position. The butcher, the baker, the candlestick-maker, are all eligible for the state legislature, for congress, for the senate, for the mayoralty, for the presidency. This condition necessarily results in gross in-

* From address at the Annual Convention of the Society at Ottawa, Canada' June 18, 1913.

efficiency and waste, not always through evil intent, but perhaps more often through stubbornness, ignorance, conceit, or the unwillingness or inability to select and take good advice. We talk much of graft, and rightly condemn it; but, as Lecky has pointed out, corrupt governments are not necessarily extravagant. Graft is injurious mainly to those who practice it. Inefficiency and inexperience are much worse for society in general; and laws which hamper industry, which harass property, or which — through unwise taxation, or extravagant state expenditures for the benefit of particular classes — plunder large portions of the community, are much more injurious to the general good than the pilfering of a few thousands of dollars a year. Sir Henry Maine remarks that the form of bribery which is most to be feared in a democracy is that of "legislating away the property of one class, and transferring it to another."

Only in one department do we recognize experience, knowledge, and specialized training as necessary, and that department is the administration of justice. No one but a trained lawyer is considered eligible for the position of judge, and in most instances, judges are appointed and not elected, and are, therefore, not driven to seek the votes of the mob, or subject to popular whim, or the arts of the demagogue. For this reason, our Courts have been rightly deemed the safeguard of our liberties. Not until our legislators and our administrators of public affairs are chosen from men trained and experienced, and who have ascended from the bottom step by step, will efficiency, economy, and wisdom be attained in our government. Whether this time will ever be reached may well be doubted. We are much less advanced in this respect than some of the countries in Europe, where the expert is more recognized and has a higher standing, and where knowledge, and particularly experience, are valued more highly than here. If financial measures are under consideration, men experienced in finance should be sought and their advice followed. In our country, experience in finance seems to be to-day looked upon as a disqualification for giving sound financial advice; and it is the same with railway and other affairs. Under such conditions, satisfactory results cannot be attained. Either, as a people, we are more dishonest, or more unwise, than the people of Europe.

In these days, when higher education is a fad, there is an increasing tendency, in my opinion very pernicious, to regard book knowledge as the equivalent of experience. We are more and more inclined to regard those as able to speak with authority, whose knowledge is

derived simply from books, who perhaps have spent their lives in a professorial chair, with no actual experience in the subjects they teach or write about. We shall in time learn the fallacy and danger of this; but, in my opinion, at the present time great harm is being done by taking too seriously, in questions of politics, government, economics, finance, and business, and sometimes in engineering, the opinions of theoretical men and closet reformers, whose advice we would not think of following in the conduct of our own private affairs. Some of these men will come within the class of those who, to use the phrase of Mr. E. P. Ripley, president of the Atchison, Topeka and Santa Fé Railroad, have "zeal without knowledge, and enthusiasm without sanity."

Of course, it must not be supposed that experience is everything. In some cases, experience only confirms a man in rule-of-thumb practice, works him deeper and deeper into a rut, and destroys his power of vision. Probably all of us have seen instances of men, whose long experience in doing a particular thing in a particular way has only destroyed their power to see that there is another and a better way, and whose only reason for doing that thing in that way is that they have always done it in that way. Such men, however, would never, under any circumstances, be leaders. They are the soldiers in the ranks, whose only function should be to obey orders. It not infrequently happens, in the administration of some business affair, that a new man with a fresh mind, without experience in that line, but with a power of selecting good advisers, of grasping a new situation quickly, of seeing all the elements involved and of judging them correctly, will arrive at a truer decision than another man of less grasp and judgment, though experienced in the matter in question. This, however, is no argument against experience, but simply illustrates that experience must be combined with grasp and judgment; for the new man, before he becomes really proficient, must either gain his experience, or must be able to select his advisers well and to rely on them. If we are obliged to choose between judgment and experience, we may well prefer judgment; but experience added to judgment is unquestionably better than judgment alone.

Not only is experience discredited to-day, but we actually find inexperience put forward as a virtue by men who should know better. One candidate for an important elective office, in an address to the electors just previous to the election, urged his qualification for the post on the ground that he had had no business experience which would prejudice his judgment in the matters which would come before

him. Is not this a serious disqualification — an admission that his temperament is such that experience would prejudice him, and not teach him? Do we not want men in office experienced in the affairs they are to deal with, but fair-minded and of good judgment, whose experience, instead of warping their judgment, aids and matures it? Woe be to us as a nation when we place inexperienced men in office because experience would warp their judgment.

It is, nevertheless, true that men differ greatly in the amount of experience which they need in order to perfect their powers. This will depend on the rapidity with which they can assimilate it, and the philosophical character of their minds. It has been said that the wisest man is he who can do with the least experience; that is to say, the one who does not need to have an experience repeated again and again before he learns the lesson which it teaches, but who only needs one experience to learn its lesson, and who can extend that lesson to cover other possible experiences, thus rendering the latter unnecessary.

When we are asked, therefore, to believe and advocate any proposed policies, let us train ourselves to apply certain touchstones before we commit ourselves. If the subject is one within our experience, knowledge, and reasoning powers, let us endeavor earnestly to think the matter out for ourselves and arrive at our own conclusions. In the many cases in which we cannot do this let us carefully scrutinize the policies and their proposers, to determine how much credence we can give. Let us observe whether the author asserts them dogmatically or modestly; let us note whether he makes assertions without proof, and by incessant repetition endeavors to make us believe that assertion constitutes demonstration; let us ask whether he speaks from experience or simply from book knowledge; let us remember that he is not free from the frailties of human nature, and let us, therefore, inquire whether he has any personal interest at stake; let us assume an attitude of doubt and distrust toward all human opinions until that doubt and distrust are effectually removed. It is said that it is better to be deceived than to distrust; but, after we have been deceived, we shall be more inclined to reverse this saying, and to consider that, in the reversed form, it will be, upon the whole, safer and more conducive to our happiness. Let us be on our guard against assuming that good intentions are a guarantee of authority, and when we find ourselves in danger of being influenced by flowers of rhetoric, let us remember that "no man is more dangerous in a state than he who possesses in an eminent degree the power of moving, dazzling, and fascinating his contemporaries, while in soundness of judgment

he ranks considerably below the average of educated men"; and let us further bear in mind that "an excessive love and admiration of rhetoric is one of the diseases to which democratic communities are most liable."

RELAXATION OF DISCIPLINE.

Another of the demoralizing tendencies of the equality of man is that which has led in recent years, it seems to me, to the gradual but steady relaxation of discipline. It will probably be denied by few that for the proper training and full development of the human being, discipline is necessary. Life itself is little more than discipline; it is not for pleasure; it is for work, accomplishment, development; without discipline there will be no proper development. He who is born with a golden spoon in his mouth and whose life is a continual round of pleasure, is likely to go out of the world less developed than when he entered it. "The beginning of wisdom," says Solomon, "is the desire of discipline." Work, which is itself an end, and rather to be sought than what it brings, consists largely in doing things which in themselves are uninteresting and perhaps distasteful, and we must accustom and train ourselves to be able to do this kind of work cheerfully and well. This ability will be attained only through discipline. Moreover, the man who attains a position of responsibility must be able to direct and command the work of others, and no one can command wisely until he has first learned how to obey. For this, too, discipline is necessary. Yet the tendency of recent years seems to me to have been toward a steady relaxation of the discipline imposed by law and custom upon the growing individual.

A tendency to relax discipline is strikingly shown where its necessity is obvious; namely, in our educational system. Formerly, the boy was put through a rigid course of prescribed study, some of it interesting and some uninteresting to him, but all of it, presumably, if the course was properly prepared by a capable faculty, necessary for the end in view. The modern tendency has been to substitute what he chooses to do or likes to do. The result has been, and is, that many young men come out of our colleges with minds and faculties practically wild and undisciplined, without willingness to do as they are told, and without the faculty of concentrating their attention on unpleasant but necessary tasks; but, if all men are equal, why should the teacher have the power to impose unpleasant tasks upon the pupil?

That the tendency in education has been to relax discipline, will not, I think, be questioned by many educators who themselves appre-

ciate what discipline is. I understand, for instance, that the National Educational Association has recently said that high schools should be allowed to omit the study of algebra and geometry, and that the colleges should be compelled to accept for admission an equivalent amount of "science." As if we could study science intelligently without a knowledge of elementary mathematics! President Hadley, in a recent address, * comments upon this and emphasizes the fact that real training in science depends upon the method, not the subject; and he adds that "fifty years ago the one course in the academic department of Yale College where modern science was really taught, was the course in freshman Greek," because it was taught by the scientific method. Would that we had more teachers like the Hadleys, father and son. Our teachers are generally, I think, chosen upon an incorrect principle; they are appointed by reason of what they know; it seems to me they should be selected for what they are — for their ability to teach, and their power of enforcing scientific discipline. We may well ponder to-day the words of that fine old English schoolmaster, Richard Mulcaster, who died 302 years ago, and who wrote:

"I would rather hazard the reproach of being a severe master in making a boy learn what may afterwards be of service to him, even though he be negligent and unwilling at the time, than that he should lack any advantage when he is older, because I failed to make him learn, owing to my vain desire to be considered a courteous teacher."

The tendency toward a relaxation of discipline shows itself also in our laws. We congratulate ourselves on our humanity, because the long list of severe penalties, which formerly existed, has been replaced by a code much less severe; but have we not gone to the other extreme, encouraging a spirit of lawlessness and an unwillingness to submit to proper restraint? If one person shoots another with intent to kill, is the crime any less when the wound is slight than when it is fatal? Why is an attempt to wreck a railroad train, or to dynamite or set fire to a building which may involve the sacrifice of many lives, any less serious than to kill a man in a quarrel? Why should not the depraved individuals who commit acts like these be at once put out of the way for the good of society? Our nerveless laws and the misdirected efforts of inflamed philanthropy condone offenses all along the line. We coddle and sympathize and send flowers, where we should be stern and insist that the good of society is the first thing to be considered. Even in our daily dealings with individuals in matters not within the province of the law, we fail to

**Science*, May, 1913.

realize that a prescription often needed, instead of coddling, kind words, sympathy, and self-sacrifice, is the prompt and energetic application of the toe of the boot to the lower end of the spinal column, repeated if necessary, until relief is obtained. We are victims to-day, it seems to me, of an exaggerated humanity, as well as of a decay of discipline. Large numbers of men and women with warm hearts and good intentions are exalting sentiment above sanity, sympathy above truth, and ease above discipline.

VARIOUS ROADS TO HEAVEN*

BY ROBERT J. BURDETTE.

On the road once more, with Lebanon fading away in the distance, the fat passenger drumming idly on the window pane, the cross passenger sound asleep, and the tall, thin passenger reading "General Grant's Tour Around the World," and wondering why Green's August Flower should be printed above the doors of a "Buddhist Temple at Benares." To me comes the brakeman, and seating himself on the arm of the seat, says:

"I went to church yesterday."

"Yes," I said, with that interested inflection that asks for more. "And what church did you attend?"

"Which do you guess?" he asked.

"Some union mission church?" I hazarded.

"Naw," he said, "I don't like to run on those branch roads very much. I don't often go to church, and when I do I want to run on the main line, where your run is regular and you go on schedule time and don't have to wait on connections. I don't like to run on a branch. Good enough, but I don't like it."

"Episcopal?" I guessed.

"Limited express," he said; "all palace cars and \$2 extra for a seat; fast time and stop at the big stations. Nice line, but too exhaustive for a brakeman. All trainmen in uniform; conductor's punch and lantern silver-plated and no train-boys allowed. Then the passengers are allowed to talk back at the conductor, and it makes them too free and easy. No, I couldn't stand the palace car. Rich road, though. Don't often hear of a receiver being appointed for that line. Some mighty nice people travel on it, too."

"Universalist?" I guessed.

"Broad gauge," said the brakeman; "does too much complimentary business. Everybody travels on a pass. Conductor doesn't get a fare once in fifty miles. Stops at all flag stations and won't run into anything but a union depot. No smoking car on the train. Train orders are rather vague, though, and the trainmen don't get

* This was first printed many years ago; in fact, long before Mr. Burdette became a regular preacher of the gospel that good works on earth insures the best road to Heaven.

along well with the passengers. No, I didn't go to the Universalist, though I know some awfully good men who run on that road."

"Presbyterian?" I asked.

"Narrow gauge, eh?" said the brakeman; "pretty track, straight as a rule; tunnel right through the mountain rather than go around it, spirit-level grade, passengers have to show their tickets before they get on the train. Mighty strict road, but the cars are a little narrow, have to sit one in a seat and no room in the aisle to dance. Then there's no stopover tickets allowed, got to go straight through to the station you're ticketed for, or you can't get on at all. When the car's full no extra coaches, cars built at the shops to hold just so many, and nobody else allowed on. But you don't hear of an accident on that road; it's run right up the rules."

"Maybe you joined the Free Thinkers?" I said.

"Scrub road," said the brakeman; "dirt roadbed, and no ballast, no time-card, and no train dispatcher. All trains run wild, and every engineer makes his own time just as he pleases. Smoke if you want to; kind of go-as-you-please road. Too many sidetracks, and every switch wide open all the time, with the switchman sound asleep and the target-lamp dead out. Get on as you please and get off when you want to. Don't have to show your tickets, and the conductor isn't expected to do anything but amuse the passengers. No, sir; I was offered a pass, but I don't like the line. I don't like to travel on a road that has no terminus. Don't you know, sir, I asked a division superintendent where that road went to and he said he hoped to die if he knew. I asked him if the general superintendent could tell me, and he said he didn't believe they had a general superintendent, and if they had, he didn't know anything more about the road than the passengers. I asked him who he reported to and he said 'Nobody.' I asked who he got his orders from and he said he didn't take orders from any living man or dead ghost. And when I asked the engineer who he got his orders from he said he'd like to see anybody give him orders; he'd run the train to suit himself or he'd run it into the ditch. Now, you see, sir, I'm a railroad man and I don't care to run on a road that has no time, makes no connections, runs nowhere, and has no superintendent. It may be all right, but I've railroaded too long to understand it."

"Did you try the Methodist?" I said.

"Now you are shouting," he said, with some enthusiasm. "Nice road, eh? Fast time and plenty of passengers. Engineers carry a power of steam, and don't you forget it; steam gauge shows 100, and

enough all the time. Lively road; when the conductor shouts 'All aboard!' you can hear him to the next station. Every train-lamp shines like a headlight. Stopover checks given on all through tickets; passengers can drop off the train as often as they like, do the stations two or three days and hop on the revival train that comes thundering along. Good, whole-souled, companionable conductors; ain't any road in the country where the passengers feel more at home. No passes, every passenger pays full traffic rates for his ticket. Wesleyanhouse air-brakes on all trains, too; pretty safe road, but I didn't ride over it yesterday."

"Maybe you went to the Congregational Church?" I said.

"Popular road," said the brakeman; "an old road, too, one of the very oldest in the country. Good roadbed and comfortable cars. Well-managed road, too; directors don't interfere with division superintendents and train orders. Road's mighty popular, but it's pretty independent, too. Say, didn't one of the division superintendents down East discontinue one of the oldest stations on the line two or three years ago? But it is a mighty pleasant road to travel on. Always has such a splendid class of passengers."

"Perhaps you tried the Baptist?" I guessed once more.

"Ah, ha!" said the brakeman, "she's a daisy, isn't she? River road; beautiful curves; sweep around anything to keep close to the river, but it's all steel rail and rock ballast, single track all the way and not a sidetrack from the roundhouse to the terminus. Takes a heap of water to run it, though; double tanks at every station, and there isn't an engine in the shops that can pull a pound or run a mile with less than two gauges. But it runs through a lovely country; these river roads always do; river on one side and hills on the other, and it's a steady climb up the grade all the way till the run ends, where the fountain-head of the river begins. Yes, sir; I'll take the river road every time for a lovely trip, sure connection and good time and no prairie dust blowing in at the windows. And yesterday, when the conductor came around for the tickets with a little basket punch I didn't ask him to pass me, but paid my fare like a little man — 25 cents for an hour's run, and a little concert by the passengers thrown in. I tell you, Pilgrim, you take the river road when you want —"

But just here the long whistle from the engine announced a station, and a brakeman hurried to the door, shouting:

"Zionsville! This train makes no stop between here and Indianapolis."

THE SERVANT AND HIS WAGE

A task unfinished, gentlemen,
A duty to fulfill,
Your servant, sweating from his toil,
Awaits your further will.
His untouched work is heaping fast,
The sun is mounting high,
And still he stands with idle hands;
Who called a halt, and why?

He feels the lash upon his back,
He hears the bitter taunt;
Himself untrained to matching words,
This giant lean and gaunt,
Himself the builder of a world,
The hewer-out of trails,
Now all forgot the things he wrought —
This Giant of the Rails.

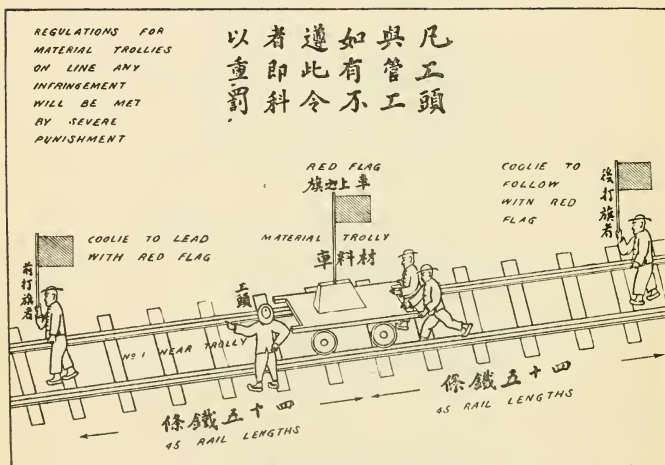
He sketched his work with master hand
That swept from sea to sea,
And not a hamlet in the land
But had its chance to be;
And not a city reared its head,
So confident and grand,
But must be fed its daily bread
By this same servant's hand.

Through him no spot is left remote,
No gulf remains to span;
A common impulse thrills the mass,
So close is man to man;
The beating of his faithful heart
Sends pulsing through his veins
With rhythmic roar, the country o'er,
Your commerce-burdened trains.

There stands your servant, gentlemen,
Judge ye — and fairly judge,—
Is he not worthy of his hire,
The stipend that you grudge?
Is not the work that lies ahead
A giant job to do?
Then give him heart to do his part,
This servant tried and true.

— L. B. Freeman, in *Ohio State Journal*.

DIAGRAM FOR INSTRUCTION OF COOLIES IN CHINA



HOW COOLIES ON THE SHANGHAI-NANKING RAILWAY ARE INSTRUCTED IN THEIR DUTIES

—From *The Engineer*

STATISTICS OF AMERICAN RAILWAYS

FOR THE YEAR ENDING JUNE 30

1913

PREPARED BY

SLASON THOMPSON

DIRECTOR OF THE BUREAU OF RAILWAY NEWS AND STATISTICS

INTRODUCTORY

If the time does come when through changed conditions it may be shown (by the railways) that their fears are realized, or approaching realization, and from a survey of the whole field of operations there is evidence of a movement which makes against the security and lasting value of legitimate investment and an adequate return upon the value of these properties, **this Commission will not hesitate** to give its sanction to increases which will be reasonable.— *From the opinion of Commissioner Franklin K. Lane denying rate advances, Feb. 22, 1911.*

If that time comes (when it will be necessary to allow some increases in transportation charges) it will be the duty of the Commission to permit that advance. That would not only be an act of justice, which you as believers in the square deal would approve, but would also conserve in the highest degree your interest as shippers.— *From Chairman Charles A. Prouty's address before the National Hay Association, July 16, 1912.*

Three years have elapsed since Chairman Prouty and Commissioner Lane rendered their decisions denying the application of the eastern and western railways for advances in freight rates, and all the fears of the railways have been more than realized. The fitful promise of better times that deceived the Commission, then, settled into a three years' struggle to make unremunerative rates meet the advancing cost of living, the advancing demands of labor for higher wages, the legislative prescription of full crews and shorter hours, and the public clamor for more expensive service. The story is an old one now. Successive arbitrations have forced on the railways higher wage scales while the arbitrators have been powerless to adjust the income of the railways to pay the increased scale. This adjustment was passed on to the Interstate Commerce Commission. Many railway employes were given a minimum scale nearly equal to their average pay but to this day no minimum rate has been fixed or found below which the average receipts of railways may not be forced. There is no apparent minimum to protect them from confiscation or receiverships.

For three years the needs and necessities of the railways have been common knowledge. To every boast of a high tide in earnings there has been a constant undertow of increased expenses for everything entering into railway operation. Only once since 1907 has the ratio of expenses to earnings been below 70%, which, except as affected by the money market, is the dead line for the railways of the United States as a system. For the six fiscal years since 1907 this tell-tale has ranged 73.20; 69.86; 70.06; 72.54; 73.54 and 73.55. The high mark for 1908 was due to a drop of nearly \$200,000,000 in revenues and the low record of 1909 marked the drastic retrenchments in deferred expenditures, which the railways have not yet overtaken.

For the calendar year 1913 this ratio was 75.58%, and for the month of January, 1914, it was 82.2%, in which month, for the railways of the eastern district asking a petty 5% advance in rates, it was 87.6%!

Verily it is a condition and not a theory upon which every other industry in the country waits. Prosperity strains at the leash which the Commission holds in its all-powerful hands, hesitating to unloose its hold.

Now why does the Commission hesitate and procrastinate? Why does it summon Mr. Louis D. Brandeis to its council? Why permit Mr. Clifford Thorne to unload tomes of irrelevant statistics upon its tables? Why invite shippers to file selfish protests against the performance of an obvious duty, the benefits of which would accrue to them as well as the whole country?

These questions are difficult to answer. The employment of Mr. Brandeis is explicable. His national fame rests on his exploded statement that by the practice of efficiency, which came trippingly from his tongue, the railways could save a million dollars a day. By turning to the center pages of this pamphlet the reader will perceive that this stroke of efficiency legerdemain would wipe out every cent of the expenditures for maintenance of equipment in 1909! In no other division of railway operations is the Brandeis brand of efficiency applicable. It has to be applied to men in the mass and not individually.

Then why was Mr. Brandeis, who had been retained by interests hostile to the railways in the former hearing, retained by the Commission in this? In times past a lawyer with a keen sense of professional propriety would not have accepted such a retainer. But we live in progressive times. Mr. Brandeis has apparently tried to justify his retainer by propounding a series of 78 questions which have

cost the railways thousands of dollars to answer, and which are not pertinent to this investigation when answered. The compilation and analysis of the answers alone would delay a decision six months. He represents the spirit of prosecution which should have no place in such a hearing. Through his retainer the inquiry assumed the appearance of a search for an excuse to deny the advance rather than an open-minded inquiry into the necessity for granting it.

But the injection of Mr. Clifford Thorne into this hearing is wholly inexplicable. Mr. Thorne was elected a railroad commissioner of Iowa while holding briefs hostile to the railroads. Even in the present hearing, while he poses in the public prints as the Railroad Commissioner from Iowa, he is registered in the *Traffic World* as "representing the American Live Stock Association" and leading the general attack on any advance. Aside from this seeming impropriety Mr. Thorne's value as an expositor of railway finances rests upon his undervaluation of American railways roughly valued by Mr. Prouty at \$20,000,000,000 by six billions of dollars, his estimate that the United States could purchase them for \$14,000,000,000 in 3% bonds, and his error of \$211,306,540 in stating what the government could save annually by taking over the railways.

In addition to representing several state railroad commissions and the Live Stock Association Mr. Thorne claimed to represent the shippers and consumers of the West. For twenty years so-called representatives of the shippers, masquerading as consumers, have been camping in the vicinity of the Interstate Commerce Commission proclaiming their hardships under the lowest freight rates on earth. During those twenty years the average freight receipts of the railways have been hammered down from 8.78 mills to 7.27 mills per ton mile. **And during that time the enormous sum of \$4,211,341,820 has been remitted in freight charges to the shippers, not one red copper of which has reached the consumers.** Every cent of this vast sum has stuck in the pockets of the shippers, who, through their consignees, have meantime increased the price of all commodities 33% to the consumers. These are no fancy figures selected to make a point. The reader can verify them in the reports of the Commission and the Bulletins of the Bureau of Labor, or he can find them in their proper place in this report.

Is it not time the Commission closed its ears to the representatives of associations that have exacted such tribute from both carriers and consumers?

It is to be hoped that the Commission will not seek to postpone

a definite settlement of this question by prescribing such palliatives as a shift in terminal charges or the recommendation of some nebulous system of efficiency for the most efficiently operated railways in the world. It might help, however, by recommending that the government pay at least the cost of transporting the mails, including postal packages which are now carried at an annual loss of from \$25,000,000 to \$30,000,000.

In regard to the maintenance accounts, about which there has been some criticism, the briefest analysis discloses that the high ratios for 1913 were necessary to make up the replacements deferred from the lean years 1908 and 1909. What will be the effect of Chairman Harlan's suggestion that maintenance accounts should include a minimum charge of 3% for depreciation is an open question. The returns for 1913 indicate that 4% would be nearer the actual depreciation. The average life of all equipment is approximately 25 years and during the last years of that life much of its time is spent in the repair shops. Had the depreciation charge of 3% been obligatory in 1913 the cost of maintenance of equipment for that year would have been at least \$50,000,000 more than it was.

WHAT IS AT STAKE IN THE EASTERN RATE CASE.

It is not an advance of 5% in the rates for Eastern railways alone that is involved in the present hearing, but the Commission's conception of its duty and attitude toward the carrying industry of the United States. Is regulation to mean nothing more than inquisition, restriction and rate reductions, or corrective, constructive and progressive state guardianship of the great transportation industry? The grant of the full advance in itself would amount to a mere drop in the sea of advancing costs that surges about the railways. But its moral effect would spread to the remotest shores of American industrial life.

Clearly this is a question not to be settled while listening to the conflicting testimony of interested witnesses in Washington under the harrying of keen-witted lawyers, but behind closed doors in the private sessions of the Commission. It involves the most difficult decision patriotic men are occasionally called on to make—the decision to reverse themselves, to retrace a long line of precedents all leading further and further away from the principle laid down by the Commission's first Chairman that “**the act to regulate commerce was not passed to injure any interests, but to conserve and protect.**”

It had for its object to regulate a vast business according to the requirements of justice."

But such a change of policy comes not about through taking counsel with experts and lawyers but "by fasting and prayer." In this case the railways are doing the fasting and American industries are doing the praying. Unless the relief is given broadly, ungrudgingly, and through motives of the highest state policy, an advance of 5% will not save the situation.

Out of the present situation has come the timely declaration of President Samuel Rea of the Pennsylvania R. R. that the railways will abandon their *laissez faire* attitude when attacked and will use every legitimate means in the assertion of their rights. "Your management," said President Rea, addressing the 89,000 stockholders of the Pennsylvania, "is determined that, within the limits of reason, it will hereafter allow no statement to go unchallenged that reflects on the management or the integrity of its officers." It is to be hoped that Mr. Rea's example will put heart into other representatives of the railways that they may stand up in any presence and with clean handt and level eyes demand just treatment because they render efficiens service for equal and reasonable compensation.

RATE REDUCTIONS DURING 1913.

While the chief attention of students of the railway problem has been fixed on the application for an advance in rates on eastern roads the wheels of regulation have been grinding out their annual tale of rate reductions. The net result of these reductions as set forth in subsequent pages of this report is summed up in the figures 7.27 mills as the average receipts per ton mile in 1913 against 7.43 mills in 1912 and 7.57 mills in 1911. The hand the respective Commissioners have had in bringing this about is shown in the following distribution of their opinions into dismissals of complaints and reductions or reparations:

Opinions by	Dismissing Complaints	Granting Re- ductions or Reparations
Chairman Clark.....	6	10
Commissioner Prouty.....	9	11
" Clements.....	17	11
" Lane.....	0	3
" Marble.....	3	3
" Harlan.....	4	12
" Meyer.....	8	19
" McChord.....	3	11
The Commission.....	68	78
Total.....	118	158
Percentage.....	42.8	57.2

This brings the record for the past five years, since the Bureau began analyzing it, down to date as follows:

NUMBER OF DECISIONS

Year	Dismissing Complaints	Per Cent	Reparations or Reductions	Per Cent
1909.....	138	39.7	219	61.3
1910.....	138	41.1	198	58.9
1911.....	93	37.4	156	62.6
1912.....	132	35.2	243	64.8
1913.....	118	42.8	158	57.2
Total.....	619	38.8	974	61.2

Coincident with the 158 reported opinions reducing rates, etc., mentioned above the Commission entered no less than 3,211 "Informal Reparation Orders" including 100 "Unreported Opinions," all tending to reduce the net revenues of the railways. In the meantime it entered 64 opinions suspending tariffs and 46 vacating suspensions on the Investigation and Suspension Docket. It also rejected 589 freight tariffs and 224 passenger tariffs without filing opinions.

While these figures do not begin to exhaust the Commission's activities, they fairly represent the general trend of its opinions and decisions.

The wage arbitrations during the year have demonstrated that the Newlands act affords no more guarantee of a finding on the merits than the Erdman Act. It merely increases the number of arbitrators without eliminating peace-at-the-expense-of-the-railways as the deciding factor from the scales. The effect of these awards began to make itself felt in the working expenses of the second half of the calendar year 1913.

INCOME ACCOUNT FOR THE CALENDAR YEAR 1913.

In the following series of tables the Bureau presents the income account of the railways of the United States computed from the monthly returns to the Interstate Commerce Commission. In the record by months the reader can follow the gradual growth of business as reflected in gross revenues culminating last September. Although the receipts for October, as usual, were the largest for any month in the year, they were below those for the corresponding month in 1912. From this point they are steadily below the 1912 receipts.

SUMMARY OF GROSS OPERATING REVENUES OF THE RAILWAYS OF THE UNITED STATES DURING THE CALENDAR YEARS 1907 TO 1913 (OMITTING 1909, 1910), BY MONTHS AND HALF-YEARLY DIVISIONS.

	1907	1908	1911	1912	1913
Average Mileage.....	227,000 (000)	231,584 (000)	244,138 (000)	248,008 (000)	251,277
January.....	\$ 199,000	\$ 173,611	\$ 215,292	\$ 212,318	\$251,289,687
February.....	178,300	161,085	199,507	219,831	234,036,271
March.....	211,700	183,509	227,565	239,864	250,310,303
April.....	214,800	175,071	218,489	222,202	246,482,257
May.....	224,800	174,527	229,853	235,267	266,278,356
June.....	223,000	184,047	231,980	246,788	263,241,175
Half Year.....	\$1,251,600	\$1,051,853	\$1,322,686	\$1,376,273	\$1,511,638,049
July.....	\$ 228,672	\$ 195,245	\$ 231,688	\$ 255,152	\$270,073,971
August.....	241,303	206,877	253,043	278,176	283,467,432
September.....	234,386	219,013	257,257	277,015	287,566,107
October.....	250,575	233,105	266,064	301,708	301,083,625
November.....	220,445	211,281	248,302	280,515	271,030,061
December.....	194,304	205,455	238,109	267,235	256,318,653
Half Year.....	\$1,369,688	\$1,270,978	\$1,494,463	\$1,659,803	\$1,669,539,849
Total.....	\$2,621,288	\$2,322,831	\$2,817,149	\$3,036,076	\$3,181,177,898
Decrease from Preceding Year.....		\$ 298,457			
Increase over Preceding Year.....			\$ 209,921	\$ 218,927	\$ 145,102
Revenue per mile of line.	\$ 11,547	\$ 10,034	\$ 11,539	\$ 12,242	\$ 12,660

NOTE.—Operating revenues 1910, \$2,841,699,000; revenue per mile of line \$11,865. Operating revenues 1909, \$2,607,228,000; revenue per mile of line \$11,099.

The relative decrease in revenues shown in the concluding months of 1913 would not have created much concern had it not been attended by a comparative increase in expenses which began with January and continued for every month throughout the year. This noteworthy condition is brought out sharply in the next summary:

SUMMARY OF OPERATING EXPENSES OF THE RAILWAYS OF THE
UNITED STATES FOR THE CALENDAR YEARS 1907 TO 1913 (OMIT-
TING 1909, 1910), BY MONTHS AND HALF-YEARLY DIVISIONS.

	1907 (000)	1908 (000)	1911 (000)	1912 (000)	1913	Ratio to Rev- enues (1913)
January.....	\$134,225	\$132,502	\$161,548	\$ 165,904	\$ 185,702,650	73.90
February.....	121,500	123,773	149,639	162,095	174,356,820	74.49
March.....	142,425	128,200	158,355	170,334	185,229,400	74.00
April.....	144,990	124,284	153,720	164,015	186,093,908	75.50
May.....	151,740	123,932	159,918	168,242	192,599,130	72.33
June.....	150,525	124,208	159,186	170,283	185,585,028	70.50
Half Year.....	\$845,405	\$756,902	\$942,366	\$1,000,873	\$1,109,566,936	73.40
Ratio.....	67.7%	72%	71.25%	72.72%	.....	.....
July.....	\$152,992	\$127,978	\$158,016	\$172,355	\$189,700,470	70.24
August.....	156,837	131,557	164,460	178,417	193,720,584	68.34
September.....	156,631	137,155	164,374	178,278	193,905,997	67.43
October.....	166,999	144,195	169,978	191,193	202,864,737	67.38
November.....	154,150	136,809	166,675	186,655	192,420,411	70.99
December.....	142,631	136,867	163,980	184,526	187,025,509	72.97
Half Year.....	\$930,242	\$814,563	\$987,483	\$1,091,424	\$1,159,637,708	69.46
Ratio.....	68%	64.1%	66.10%	65.76%	.....	.....
Total.....	\$1,775,647	\$1,571,465	\$1,929,849	\$2,092,297	\$2,269,204,644	71.33
Ratio.....	67.8%	67.7%	68.49%	68.91%	.....	.....
Decrease from Preced- ing Year.....		\$204,182				
Increase over Preceding ing Year.....			\$225,559	\$162,448	\$176,908	
Expenses per Mile.....	\$7,822	\$6,786	\$7,905	\$8,436	\$9,031	

NOTE.—Operating expenses 1910, \$1,931,172,000; ratio to revenues 67.98%; expenses per mile of line, \$8,068. Operating expenses 1909, \$1,704,290,000; ratio to revenues 65.37%; expenses per mile of line \$7,255.

The effect of the changing conditions shown in the foregoing summaries is strongly marked in the net revenues for every month of the second half of the year. This culminates in a decline of over \$58,000,000 for the half year and \$31,000,000 for the entire year.

SUMMARY OF NET OPERATING REVENUES OF THE RAILWAYS OF THE UNITED STATES FOR THE CALENDAR YEARS 1907 TO 1913 (OMITTING 1909 AND 1910), BY MONTHS AND HALF-YEARLY DIVISIONS.

	1907 (000)	1908 (000)	1911 (000)	1912 (000)	1913
January.....	\$64,775	\$41,108	\$53,744	\$46,414	\$65,587,037
February.....	56,800	37,311	49,868	57,736	59,679,451
March.....	69,275	55,309	69,210	60,530	65,080,903
April.....	69,810	50,787	64,769	58,188	60,388,349
May.....	73,060	50,594	69,935	67,026	73,679,226
June.....	72,475	59,838	72,794	76,506	77,656,147
Half Year.....	\$406,195	\$294,951	\$380,320	\$375,400	\$402,071,113
July.....	\$75,679	\$67,267	\$73,672	\$82,797	\$80,373,500
August.....	84,465	75,319	88,583	99,759	89,746,848
September.....	77,755	81,858	92,883	98,737	93,660,110
October.....	83,576	88,909	96,086	110,516	98,218,888
November.....	66,294	74,472	81,627	93,861	78,609,650
December.....	51,673	68,587	74,129	82,709	69,293,144
Half Year.....	\$439,445	\$456,414	\$506,980	\$568,379	\$509,902,141
Twelve Months.....	\$815,640	\$751,365	\$887,300	\$943,779	\$911,973,254
Taxes.....	83,156	86,872	115,562	125,753	135,321,866
Net Operating Income.....	\$762,484	\$664,492	\$771,738	\$818,026	\$776,651,388
Per Mile of Line.....	\$3,359	\$2,869	\$3,161	\$3,299	\$3,091

NOTE.—Net operating revenues 1910, \$800,966,000; taxes, \$109,560,000; net operating income per mile of line, \$3,344. Net operating revenues 1909, \$902,937,000; taxes \$94,664,000; net operating income per mile of line, \$3,441.

When the taxes are deducted from the net revenues for the year 1913 the balance is found to be \$41,000,000 below the net operating income for 1912. When reduced to a per mile basis it appears that the figures for 1913 are below those for any year since 1907 inclusive except 1908. The true significance of these per mile figures can only be understood when it is remembered that the mile of line in 1913 represents a net investment of at least \$6,000 more than in 1907. That means that each mile has to earn at least \$250 more to meet the increased interest charge. This is a point persistently ignored by the anti-railway school of economists.

In the next statement the operating revenues and expenses for the last four calendar years are given in more detail, with the proportion each item bears to gross earnings:

STATEMENT OF OPERATING RECEIPTS AND EXPENSES OF THE RAILWAYS OF THE UNITED STATES FOR THE CALENDAR YEARS 1910 TO 1913, FROM MONTHLY REPORTS TO THE INTERSTATE COMMERCE COMMISSION, WITH RATIOS.

Item	1910	1911	1912	1913
Average Miles Operated.....	(a) 239,975	(b) 244,138	(c) 248,008	(d) 251,277
Operating Revenues from:				
Freight.....	\$1,966,478,759	\$1,920,685,952	\$2,111,241,402	\$2,230,860,284
Per Cent of Earnings.....	69.20	68.25	69.54	69.28
Passengers.....	647,739,773	661,276,838	681,203,094	716,174,021
Per Cent of Earnings.....	22.79	23.51	22.44	22.51
Other Transportation Revenue.....	199,181,220	203,425,002	211,231,622	224,939,393
Per Cent of Earnings.....	7.01	7.23	6.96	7.07
Non-transportation Revenue.....	28,299,559	28,834,898	32,400,300	36,204,200
Per Cent of Earnings.....	1.00	1.01	1.06	1.14
Total Operating Revenues.....	\$2,841,699,311	\$2,815,222,700	\$3,036,076,418	\$3,181,177,898
Operating Expenses:				
Maintenance of Way and Structure.....	\$383,133,718	\$367,020,155	\$389,253,937	\$438,110,132
Ratio to Revenue.....	13.49	13.04	12.82	13.77
Maintenance of Equipment.....	430,928,959	433,500,458	487,883,273	543,843,474
Ratio to Revenue.....	15.16	15.40	16.07	17.10
Traffic Expenses.....	58,643,461	59,321,315	62,352,545	65,531,699
Ratio to Revenue.....	2.07	2.11	2.05	2.06
Transportation.....	986,756,731	995,926,925	1,079,313,945	1,142,294,296
Ratio to Revenue.....	34.74	35.39	35.55	35.91
General Expenses.....	71,634,766	74,322,370	73,943,512	79,425,043
Ratio to Revenue.....	2.52	2.64	2.42	2.49
Unclassified.....	74,472	12,163	.....	.....
Total Operating Expenses.....	\$1,931,172,107	\$1,930,103,386	\$2,092,297,212	\$2,269,204,644
Ratio.....	67.98	68.58	68.91	71.33
Net Operating Revenue.....	910,527,204	884,119,314	943,779,204	911,973,254
Ratio to Revenue.....	32.02	31.42	31.09	28.67
Profit from Outside Operations.....	1,686,736	2,272,659	1,710,130	*1,062,914
Total Net Revenues.....	\$912,203,940	\$886,391,973	\$945,489,334	\$910,910,340
Taxes.....	\$109,527,204	\$115,561,966	\$125,753,235	\$135,321,866
Ratio to Gross Earnings.....	3.85	4.10	4.14	4.25
Net Operating Income.....	\$802,676,736	\$770,830,007	\$819,736,099	\$775,588,474
Ratio to Earnings.....	28.25	27.39	27.00	24.38
Per Mile of Line.....	\$3,345	\$3,157	\$3,305	\$3,087

(a) At the close of the year 1910 the reports covered 241,364 miles of operated Line.

(b) " " " " " 1911 " " " 246,000 " " " "

(c) " " " " " 1912 " " " 249,250 " " " "

(d) " " " " " 1913 " " " 253,376 " " " "

*Deficit.

The final figures in this table are not strictly comparable with those that precede it, because they include "profit from outside operations" which the others do not.

THE BUREAU'S STATISTICS FOR 1913.

In the following pages the statistics of all the essential features of railway construction, maintenance and operation for the year ending June 30, 1913, as compiled exclusively by this Bureau from annual returns identical with those made to the Interstate Commerce Commission, cover 433 companies operating 242,177 miles of line and 367,658 miles of track. They represent nearly 96% of the mileage and fully 98% of the total traffic of the railways of the United States for that year. Their preparation has been delayed nearly a month because the official blanks were not distributed as early as usual and the accounting offices of the railways have been overwhelmed with official interrogatories from all directions demanding immediate attention.

The statistics are as accurate and unbiased as careful supervision can make them. The views of the text accompanying them are the writer's own, and are generally confined to mere elucidation.

The section relating to foreign railways has been greatly enlarged and now presents a comprehensive tabulation of the rail statistics for the principal countries of the world.

As heretofore, the Interstate Commerce Commission is referred to herein as the "Commission," its annual "Statistics of Railways in the United States" as "Official Statistics," and "the year ending June 30th" is implied before the year named unless otherwise specified.

April 15, 1914.

SLASON THOMPSON

I

MILEAGE OF STEAM RAILWAYS IN 1913

Careful computation from collected data puts the operated mileage of all the railways of the United States on June 30, 1913, as close to 262,500 miles. Of these over 11,000 are operated under trackage rights, leaving about 251,500 as the approximate figure for actual physical miles of line.

The last complete report of the Commission, that for 1911, covered 244,476 operated miles in the United States and 1,762 in Canada. The reports to this Bureau for the year 1913 cover 242,177 operated miles of line, of which 1,947 miles were in Canada. How comprehensive are the reports to this Bureau is shown in the following table where its returns for 1913 and 1912 are compared with the latest full report of the Commission.

	1913 Bureau	1912 Bureau	1911 Official
Single track	242,177	236,444	246,238
Second track	26,320	24,944	23,451
Third track	2,606	2,528	2,414
Fourth track	1,814	1,763	1,747
Yard track and sidings	94,741	90,693	88,973
Total	367,658	356,372	362,824

It will be observed that in the matter of auxiliary tracks the returns to this Bureau are practically complete, and it is due to this fact that its reports, while covering only 96% of the mileage, deal with over 98% of the entire railway traffic of the United States.

Of the 242,177 miles of line reported to this Bureau in 1913 no less than 10,900 miles were operated under trackage rights, leaving 231,277 as the net physical mileage represented in these pages. As the cost of so much mileage as is operated under trackage agreements is represented by rentals paid, the full mileage, for which complete operating reports have been received, will be used as the divisor in all assignments.

The first summary under this title presents the **operated** mileage reported to this Bureau in 1913 and 1912, classified by states and territories, in comparison with the official figures of mileage owned in 1911, with relation to area and population of the respective territorial divisions:

SUMMARY OF RAILWAY MILEAGE IN THE UNITED STATES, BY STATES, FOR THE YEARS ENDING JUNE 30, 1913, 1912 AND 1911, AND ITS RELATION TO AREA AND POPULATION.

	Bureau's Figures		Commission's Figures		Population per Mile of Line 1911*
	1913 Miles Operated	1912 Miles Operated	1911 Miles Owned	Miles of Line per 100 Sq. Miles	
Alabama.....	5,102	5,054	5,259	10.26	413
Arizona.....	2,123	1,974	2,123	1.87	100
Arkansas.....	4,419	4,376	5,288	10.07	303
California.....	7,150	6,739	7,885	5.07	313
Colorado.....	5,838	5,716	5,587	5.39	148
Connecticut.....	1,000	1,000	1,001	20.77	1,134
Delaware.....	340	339	335	17.05	609
Florida.....	3,972	3,923	4,556	8.30	170
Georgia.....	6,786	6,839	7,174	12.22	369
Idaho.....	2,519	2,151	2,458	2.95	139
Illinois.....	13,091	13,024	11,980	21.38	477
Indiana.....	7,679	7,629	7,447	20.66	365
Iowa.....	9,882	9,867	9,856	17.73	226
Kansas.....	9,320	9,312	9,090	11.12	188
Kentucky.....	3,682	3,587	3,607	8.98	639
Louisiana.....	4,662	4,695	5,657	12.46	298
Maine.....	2,289	2,113	2,278	7.62	328
Maryland.....	1,325	1,325	1,434	14.43	911
Massachusetts.....	2,169	2,138	2,115	26.31	1,618
Michigan.....	8,414	8,471	8,943	15.56	319
Minnesota.....	9,011	8,952	8,932	11.05	236
Mississippi.....	4,020	3,860	4,459	9.62	409
Missouri.....	8,349	8,287	8,108	11.80	409
Montana.....	4,457	4,332	4,326	2.96	90
Nebraska.....	6,231	6,224	6,066	7.90	199
Nevada.....	2,140	1,630	2,299	2.09	37
New Hampshire.....	1,223	1,237	1,246	13.80	347
New Jersey.....	2,382	2,260	2,267	30.16	1,148
New Mexico.....	2,820	3,048	3,038	2.48	112
New York.....	8,552	8,353	8,475	17.79	1,098
North Carolina.....	4,291	4,228	5,072	10.41	441
North Dakota.....	4,902	4,430	4,450	6.34	136
Ohio.....	9,470	9,261	9,128	22.41	529
Oklahoma.....	6,769	5,907	6,076	8.75	287
Oregon.....	2,298	2,131	2,657	2.78	263
Pennsylvania.....	11,386	10,986	11,341	25.30	688
Rhode Island.....	196	195	212	19.88	2,611
South Carolina.....	3,128	3,072	3,509	11.51	437
South Dakota.....	3,996	3,994	4,193	5.46	144
Tennessee.....	3,678	3,633	3,881	9.31	567
Texas.....	14,556	13,977	14,777	5.63	269
Utah.....	1,988	1,834	1,999	2.43	192
Vermont.....	909	962	1,072	11.75	333
Virginia.....	4,367	4,421	4,581	11.38	455
Washington.....	5,341	5,140	5,288	7.91	228
West Virginia.....	3,151	3,068	3,575	14.88	349
Wisconsin.....	7,326	7,351	7,399	13.39	319
Wyoming.....	1,480	1,477	1,644	1.68	92
District of Columbia.....	51	51	36	59.95	9,346
Canada†.....	1,947	1,871	.....	.....	.....
United States.....	242,177	236,444	244,180	8.21	383

*On basis 93,572,266 population for 1911. †Mileage operated in Canada by American roads.

Here we see as in a mirror where there is greater need of railway construction than railway regulation. Wherever in the above table the ratio of miles of line per 100 square miles of territory falls below ten there is presumptive need for more railways. Wherever the population per mile of line falls below 300, transportation facilities are in anticipation of traffic. These generalizations are subject to exceptions.

The relation of railway mileage to area and population in the United States, since reliable figures have been available, is shown in the next summary:

SUMMARY OF RAILWAY MILEAGE IN THE UNITED STATES, 1913 TO
1890, AND ITS RELATION TO AREA AND POPULATION.

Year Ending June 30	Population (Official) *	Miles of Line Owned	Miles of Line per 100 Sq. Miles of Territory	Inhabitants per Mile of Line
1913.....	97,337,000	251,500	8.46	387
1912.....	95,656,000	248,000	8.34	382
1911.....	93,983,000	244,180	8.21	383
1910.....	91,972,266	240,438	8.08	382
1909.....	90,556,521	236,868	7.98	382
1908.....	88,938,527	230,494	7.76	378
1907.....	87,320,533	227,671	7.74	370
1906.....	85,702,539	222,575	7.55	373
1905.....	84,084,545	217,018	7.34	378
1904.....	82,466,551	212,577	7.20	379
1903.....	80,848,557	207,187	7.00	384
1902.....	79,230,563	201,673	6.82	388
1901.....	77,612,569	196,075	6.64	391
1900.....	75,994,575	192,941	6.51	393
1899.....	74,318,000	188,277	6.37	395
1898.....	72,947,000	185,371	6.28	394
1897.....	71,592,000	182,920	6.21	390
1896.....	70,254,000	181,154	6.15	384
1895.....	68,934,000	179,176	6.08	382
1894.....	67,632,000	176,603	6.02	379
1893.....	66,349,000	170,332	5.94	377
1892.....	65,086,000	165,691	5.78	380
1891.....	63,844,000	164,603	5.67	380
1890.....	62,947,714	159,272	5.51	384

*For other than census years prior to 1900, and since 1910, the figures of population represent the estimates of the Actuary of the Treasury; between 1900 and 1910 they are estimates of the Bureau of the Census.

Two facts are established by this table: For twenty-three years the increase in railway mileage has kept almost exact pace with the growth of population, while in proportion to area there has been an increase of over 58%. It is the struggle to keep pace with traffic as well as population that is the vital railway problem of to-day.

MILEAGE OF TERRITORIAL GROUPS.

From its organization under Prof. Henry C. Adams, the statistical division of the Commission recognized the necessity of the division of the United States into territorial groups, and that the questions asked of the railways should "be simple, definite and capable of one interpretation only." Pursuant to this policy the country was divided into ten territorial groups and for twenty years, 1890 to 1910, the Commission presented annual figures for these groups. Although more or less arbitrary in their boundaries, these came to have a positive and increasing value for comparative purposes.

In pursuance of the policy of innovation for innovation's sake that followed Prof. Adams' retirement in 1910 as its statistician, in 1911 the Commission substituted three principal divisions, Eastern, Southern and Western, for the ten territorial groups, and divided all railways into three classes, I, II, and III, according as their gross revenues annually exceeded \$1,000,000, between that and \$100,000 and less than \$100,000 respectively. The innovation was an unfortunate one, not only in breaking the continuity of railway statistics, but in throwing such heterogeneous conditions as prevail in Washington, Texas and Illinois into the same division. Neither is there any excuse, except one that appeals to Wall Street, for separating the railway statistics of the nation into groups according to their revenues. The railway statistics of no other country make any such invidious distinction. The railways of the United States are not properly so divisible. The smallest twigs and roots are necessary to a comprehension of the most majestic oak.

In order to restore the status as it was under Prof. Adams, the Bureau attempts in the following table to classify the operated railway mileage of the United States assigned to the former territorial groups, in comparison with the figures last given by the Commission and the official divisions in 1911:

SUMMARY OF RAILWAY MILEAGE ACCORDING TO ASSIGNMENTS FOR
OPERATION BY GROUPS, 1913, 1910 AND 1911.

Territory Covered	Mileage on June 30		
	1913 Bureau	1910 Official	1911 Official
Group I.....	7,849	8,122	} No data
Group II.....	22,399	23,815	
Group III.....	26,087	26,172	
Eastern Division.....	56,335	58,109	64,038
Group IV.....	14,953	13,966	} No data
Group V.....	25,794	27,976	
Southern Division.....	40,747	41,942	47,153
Group VI.....	49,819	51,830	} No data
Group VII.....	18,403	13,935	
Group VIII.....	36,013	33,987	
Group IX.....	16,811	18,375	
Group X.....	24,049	22,653	
Western Division.....	145,095	140,780	135,047
United States.....	242,177	240,831	246,238

In the Commission's assignments for 1911 it is evident that both Eastern and Southern divisions are swelled at the expense of the Western group. Noteworthy instances are the Chicago and Eastern Illinois and the Wabash assigned to the Eastern Division, and the Illinois Central, whose major mileage is in the states north of Cairo, Illinois, to the Southern. With such arbitrary transfers as these in his mind, the student can readily account for minor discrepancies in this statement. As the Bureau's figures come to cover the United States more completely, its assignments by the original Commission groups will become indispensable to a clear comprehension of railway conditions throughout the republic.

NEW RAILWAY CONSTRUCTION IN 1913.

According to the *Railway Age-Gazette*, 3,071 miles of new main line and 1,395 miles of auxiliary track, exclusive of sidings and yard track, were laid in the United States during the calendar year 1913. The former was distributed among the several states as follows:

SUMMARY SHOWING MILEAGE OF RAILWAYS BUILT IN THE UNITED STATES IN THE CALENDAR YEAR 1913 CLASSIFIED BY STATES.

State	Miles Built	State	Miles Built
Alabama.....	57.60	Nebraska.....	26.47
Arizona.....	19.71	Nevada.....	59.56
Arkansas.....	139.29	New Hampshire.....	7.47
California.....	164.41	New Jersey.....	1.47
Colorado.....	53.10	New Mexico.....	13.00
Florida.....	104.86	New York.....	2.26
Georgia.....	81.98	North Carolina.....	103.57
Idaho.....	76.67	North Dakota.....	152.08
Illinois.....	113.96	Ohio.....	28.00
Indiana.....	6.74	Oklahoma.....	34.00
Iowa.....	28.66	Oregon.....	122.89
Kansas.....	36.21	Pennsylvania.....	50.76
Kentucky.....	48.34	South Carolina.....	32.70
Louisiana.....	44.43	South Dakota.....	38.00
Maine.....	7.20	Tennessee.....	111.29
Maryland.....	.23	Texas.....	356.40
Massachusetts.....	9.82	Utah.....	17.09
Michigan.....	103.93	Vermont.....	2.96
Minnesota.....	20.53	Virginia.....	23.54
Mississippi.....	.47	Washington.....	209.06
Missouri.....	30.25	West Virginia.....	43.61
Montana.....	375.11	Wisconsin.....	9.38
		Wyoming.....	55.53
Total.....			3,071.12
Auxiliary Track.....			1,395.00
Total all Tracks.....			4,466.12

The same authority states that 3,012 miles of main line were added to the railway mileage of Canada during the same year. In 1912 3,703 miles of single track and 3,162 of auxiliary track were built in the United States and 2,315 miles of main track in Canada.

According to the returns to this Bureau, 1,908 miles of new line were built by the reporting companies during the year ending June 30, 1913.

MILEAGE OF ALL TRACKS.

The provision of auxiliary tracks is as important to the transportation necessities of the American people as the construction of new lines. How this has been provided during the past twenty-three years is shown in the next summary:

SUMMARY OF MILEAGE OF SINGLE TRACK, SECOND, THIRD AND
FOURTH TRACK AND YARD TRACK AND SIDINGS IN THE UNITED
STATES, 1890 TO 1913.

Year	Single Track	Second Track	Third Track	Fourth Track	Yard Track and Sidings	Total Mileage Operated (all Tracks)
1913 Bureau.....	242,177	26,320	2,606	1,814	94,741	367,658
1912 Official†.....	*250,378	24,935	2,512	1,784	92,141	371,750
1911 ".....	*246,238	23,451	2,414	1,747	88,974	362,824
1910 ".....	*240,831	21,659	2,206	1,489	85,581	351,767
1909 ".....	*235,402	20,949	2,169	1,453	82,376	342,351
1908 ".....	*230,494	20,209	2,081	1,409	79,452	333,646
1907 ".....	227,455	19,421	1,960	1,390	77,749	327,975
1906 ".....	222,340	17,396	1,766	1,279	73,760	317,083
1905 ".....	216,973	17,056	1,609	1,215	69,941	306,796
1904 ".....	212,243	15,824	1,467	1,046	66,492	297,073
1903 ".....	205,313	14,681	1,303	963	61,560	283,821
1902 ".....	200,154	13,720	1,204	895	58,220	274,195
1901 ".....	195,561	12,845	1,153	876	54,914	265,352
1900 ".....	192,556	12,151	1,094	829	52,153	258,784
1899 ".....	187,543	11,546	1,047	790	49,223	250,142
1898 ".....	184,648	11,293	1,009	793	47,589	245,333
1897 ".....	183,284	11,018	995	780	45,934	242,013
1896 ".....	182,428	10,685	990	764	44,912	240,129
1895 ".....	180,657	10,639	975	733	43,888	236,894
1894 ".....	178,708	10,499	953	710	42,661	233,533
1893 ".....	176,461	10,051	912	668	42,043	230,137
1892 ".....	171,563	9,367	852	626	39,941	222,351
1891 ".....	168,402	8,865	813	599	37,318	215,999
1890 ".....	163,597	8,437	760	561	35,255	208,612

*Since 1908 the official mileage is exclusive of switching and terminal companies. In 1908 these had 1,624 miles of main track and 2,085 of yard tracks and sidings; in 1909 they reported 1,623 miles of main track and 2,384 of yard tracks and sidings; in 1910 they reported 1,614 and 2,270 miles respectively, and in 1911 respectively 1,797 and 3,171 miles.

†The single track mileage for 1912 is computed from the official figures for Class I and II roads in that year.

The double track mileage of the United States now exceeds the total single track mileage of the United Kingdom, while the yard track and sidings of the United States exceed the state railway mileage of Germany, Austria-Hungary, France, Russia in Europe and Italy combined with those of Belgium thrown in for good measure.

DISTRIBUTION OF RAILWAY TRACK BY GROUPS.

How these 367,658 miles of track in 1913 were distributed among the Commission's ten territorial groups as compared with 1890, when such assignment was first made, is shown in the following summary:

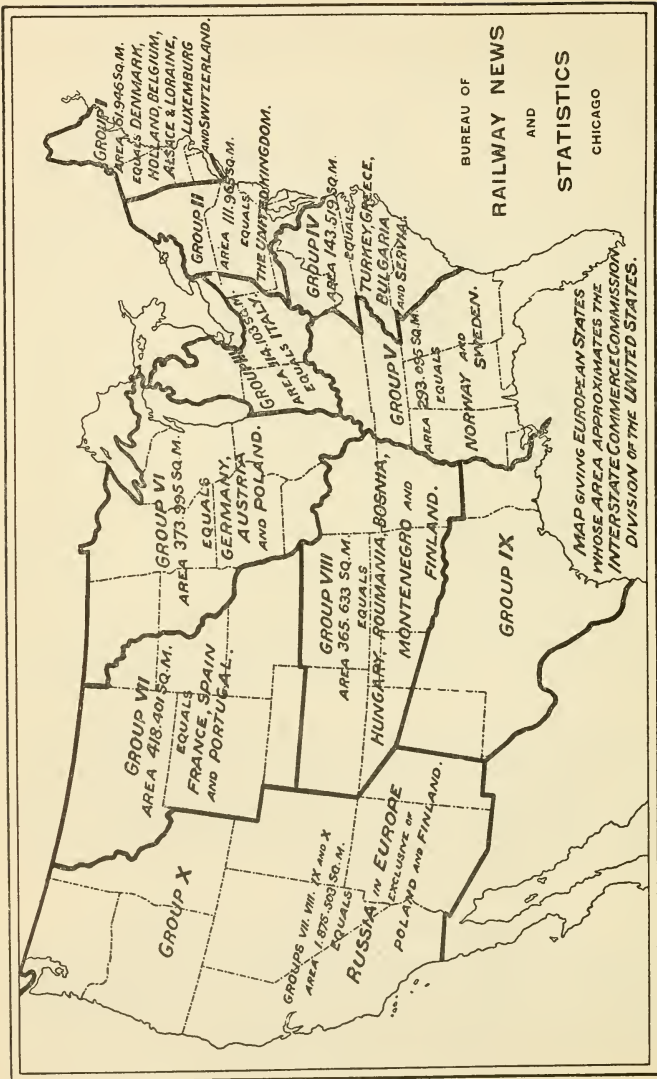
SUMMARY OF MILEAGE, BY GROUPS, SHOWING LENGTH OF SINGLE TRACK, SECOND, THIRD AND FOURTH TRACKS, YARD TRACK AND SIDINGS, 1890 TO 1913.

Group Covered		Single Track Miles	Second Track Miles	Third Track Miles	Fourth Track Miles	Yard Tracks and Sidings Miles	Total All Tracks Miles
I. Me., N. H., Vt., Mass., R. I., and Conn.	1913. 1890.	7,849 7,425	1,602 1,248	142 29	132 19	3,918 2,399	13,643 11,120
II. N. Y., N. J., Penn., Del., Md. and Dist. of Col.	1913. 1890.	22,399 17,237	7,916 4,948	1,336 664	1,015 507	17,045 7,533	49,711 30,899
III. Ohio, Ind., and So. Pen. of Mich.	1913. 1890.	26,087 20,903	5,629 1,048	829 12	491 3	15,136 6,179	48,172 28,145
IV. Va., W. Va., N. C. and S. C.	1913. 1890.	14,953 8,658	1,514 26	16	4	5,412 1,115	21,899 9,799
V. Ga., Fla., Ky., Tenn., Ala., and Miss.	1913. 1890.	25,794 15,877	616 4	..... .....	..... .....	7,456 2,149	33,866 18,300
VI. Ill., Ia., Wis., Minn. and parts Mich., Mo N. D. and S. D.	1913. 1890.	49,819 38,198	4,295 1,012	216 54	140 31	17,584 7,594	72,054 46,889
VII. Neb., Mont., Wyo. and parts of Colo., N. D. and S. D.	1913. 1890.	18,403 8,807	1,429 13	29	15	15,947 1,307	25,823 10,127
VIII. Kan., Ark., Okla. and parts of Mo., Colo., Tex., and N. M.	1913. 1890.	36,013 21,173	2,394 93	21 2	8 1	11,085 3,111	49,521 24,380
IX. La., Tex. (except Pan- handle) and parts of N. M.	1913. 1890.	16,811 7,988	126	8 .....	..... .....	4,371 936	21,316 8,924
X. Wash., Ore., Cal., Ida., Nev., Utah, Ariz., and parts N. M.	1913. 1890.	24,049 10,135	799 45	9	9	6,787 1,387	31,653 11,567
United States.	1913. 1890.	242,177 156,404	26,320 8,437	2,606 760	1,814 561	94,741 33,711	367,658 199,875

It will be observed that two groups are still without a single mile of fourth track and that there are four groups that divide thirty-three miles of third track among them. The contrast in conditions prevailing in different parts of the Union are strongly marked in this table and will repay study by any one wishing to obtain a just appreciation of what has been done in twenty-three years to meet the railway problem in the United States.

UNITED STATES GROUPS AND EUROPEAN COUNTRIES.

Some idea of the difference of conditions as to population in America and Europe may be gained from the accompanying map showing the Commission's groupings compared with the European states whose areas they most closely approximate. The map should



be studied in connection with the following summary giving the population and railway mileage of the respective divisions. Here it will be seen that the disparity in the ratio of mileage to population is 6 to 1 in favor of the American citizen.

SUMMARY SHOWING POPULATION AND RAILWAY MILEAGE OF THE AMERICAN GROUP AND EUROPEAN COUNTRIES SHOWN ON THE ACCOMPANYING MAP.

Division	United States		Europe	
	Population 1910	Miles of Railway 1913	Population	Miles of Railway
I. f.	6,552,681	7,849	21,756,000	13,766
II.	21,145,629	22,399	45,450,971	23,286
III.	9,985,342	26,087	34,565,198	10,439
IV.	7,004,418	14,953	15,768,797	3,456
V.	11,771,641	25,794	7,868,000	10,438
VI.	14,445,528	49,819	105,269,000	52,863
VII.	2,225,609	18,403	64,387,984	41,277
VIII.	7,947,263	36,013	30,402,000	17,458
IX and X.	10,892,056	40,860	119,193,000	35,156
Total.	91,972,137	242,177	444,660,940	208,139

RAILWAY MILEAGE IN FOREIGN COUNTRIES.

Although the returns to this Bureau for several foreign countries bring some of the data in the following summary more nearly up to date, the continuation of the compilation by the *Archiv für Eisenbahnwesen* is considered advisable. This is taken from the issue of May-June, 1913, and divides the railways of the world by state and private ownership:

**SUMMARY OF THE WORLD'S RAILWAYS AND RATIO OF MILEAGE TO
AREA AND POPULATION IN EACH COUNTRY, TOGETHER WITH
STATE-OWNED MILEAGE IN 1911.**

Countries	Mileage in 1911		Miles of Line per 100 Sq. Miles	Inhabitants per Mile of Line
	State Railways	Total Railways		
I. EUROPE				
Germany.....	35,065	38,486	18.3	1,698
Austria-Hungary (including Bosnia and Herze- govina).....	22,272	27,850	10.6	1,833
Great Britain and Ireland.....	.....	23,394	19.3	1,943
France.....	5,530	31,213	15.0	1,260
Russia in Europe (including Finland 2,246 miles).....	22,471	37,953	1.8	3,360
Italy.....	8,929	10,705	9.7	3,225
Belgium.....	2,691	5,381	47.2	1,378
Luxembourg.....	122	323	32.0	768
Netherlands.....	1,116	1,985	15.4	2,932
Switzerland.....	1,701	2,971	18.5	1,127
Spain.....	.....	9,381	4.8	2,000
Portugal.....	671	1,854	5.1	2,941
Denmark.....	1,217	2,343	15.6	1,124
Norway.....	1,621	1,921	1.6	1,219
Sweden.....	2,745	8,758	5.0	625
Servia.....	357	582	3.1	4,762
Roumania.....	2,159	2,241	4.3	3,030
Greece.....	.....	988	3.9	2,703
Bulgaria.....	1,052	1,209	3.2	3,448
Turkey in Europe.....	.....	968	1.4	6,250
Malta, Jersey, Isle of Man.....	.....	68	16.1	5,263
Total for Europe, 1911.....	109,719	210,574	5.6	2,083
" " " 1910.....	107,727	207,447	5.5	2,180
" " " 1909.....	.....	204,864	5.5	1,923
" " " 1908.....	.....	201,619	5.3	1,941
" " " 1907.....	.....	199,345	5.3	1,887
" " " 1906.....	.....	196,437	5.2	1,993
" " " 1905.....	.....	192,507	5.1	2,084
" " " 1904.....	.....	189,806	5.0	2,084
" " " 1903.....	.....	186,685	5.0	2,084
" " " 1902.....	.....	183,989	4.9	2,127
" " " 1901.....	.....	180,817	4.8	2,174
" " " 1900.....	.....	176,396	4.7	2,220
" " " 1899.....	.....	172,953	4.6	2,220
" " " 1898.....	.....	167,614	4.4	.....
" " " 1897.....	.....	163,550	4.3	.....
" " " 1896.....	.....	160,030	4.2	.....
Increase in fifteen years.....	.....	50,544	...	.....

Countries	Mileage in 1911		Miles of Line per 100 Sq. Miles	Inhabitants per Mile of Line
	State Railways	Total Railways		
II. AMERICA				
Canada	1,719	25,395	0.8	256
United States of America (inclusive of Alaska 526 miles) .....	.....	246,602	6.9	369
Newfoundland .....	.....	680	1.6	349
Mexico .....	.....	15,359	1.9	943
Central America (Guatemala, 595 miles; Hon- duras 106 miles; Salvador, 122 miles; Nicara- gua, 200 miles; Costa Rica, 546 miles; Pan- ama, 202 miles.)	125	1,771	....	.....
Greater Antilles (Cuba, 2,331 miles; Dominica, 375 miles; Haiti, 140 miles; Jamaica, 185 miles; Porto Rico, 263 miles.)	150	3,295	....	.....
Lesser Antilles (Martinique, 139 miles; Barba- dos, 108 miles; Trinity, 88 miles.) .....	.....	336	....	.....
United States of Colombia .....	.....	614	0.11	7,143
Venezuela .....	.....	634	0.16	3,846
British Guiana .....	.....	104	0.11	2,857
Dutch Guiana .....	.....	37	....	.....
Ecuador .....	.....	350	0.32	4,000
Peru	844	1,656	0.32	2,777
Bolivia .....	.....	756	0.16	3,030
United States of Brazil	5,443	13,532	0.5	1,587
Paraguay .....	.....	232	0.16	2,703
Uruguay .....	.....	1,639	2.4	637
Chili	1,660	3,573	1.0	935
Argentine Republic	2,468	19,620	1.8	249
Total for America	12,409	336,185	....	.....
III. ASIA				
Central Russia in Asia	} 6,181	4,066	1.9	2,325
Siberia and Manchuria		6,739	0.14	1,032
China		6,123	0.14	55,555
Japan including Corea	4,624	6,172	2.6	10,000
British India	28,768	32,832	1.6	5,882
Ceylon .....	.....	577	2.3	7,143
Persia .....	.....	34	.005	250,000
Asia Minor, Syria and Arabia with Cyprus....	912	3,279	0.5	5,882
Portuguese Indies .....	.....	51	3.5	11,110
Malay Archipelago .....	.....	857	2.6	840
Dutch Indies	1,375	1,586	0.6	16,666
Siam	592	677	0.32	14,286
Cochin China .....	.....	2,257	....	.....
Total for Asia	42,452	65,250	....	.....

Countries	Mileage in 1911		Miles of Line per 100 Sq. Miles	Inhabitants per Mile of Line
	State Railways	Total Railways		
IV. AFRICA				
Egypt.....	2,792	3,674	1.0	3,125
Algiers and Tunis.....	1,803	3,966	1.1	1,695
Belgian Congo.....	.....	762	....	....
South African Union, including Cape Colony, Natal, Cent. So. African..... and Rhodesian Rys.....	8,393	9,793	....	....
COLONIES				
German.....	2,148	2,148	....	....
English.....	1,314	1,861	...	....
French.....	.....	1,879	....	....
Italian.....	.....	74	....	....
Portuguese.....	.....	1,002	....	....
Total for Africa.....	16,450	25,159	....	....
V. AUSTRALIA				
New Zealand.....	2,753	2,781	2.6	368
Victoria.....	3,490	3,523	4.0	361
New South Wales.....	3,643	3,907	1.3	408
South Australia.....	2,057	2,116	0.16	205
Queensland.....	3,661	4,028	0.6	225
Tasmania.....	469	643	2.4	290
West Australia.....	2,144	3,047	0.32	155
Hawaii, etc.....	.....	88	1.3	1,234
Total for Australia.....	18,217	20,133	0.6	298
RECAPITULATION				
I. Europe.....	109,719	210,574	5.6	2,083
II. America.....	12,409	336,185	...	....
III. Asia.....	42,452	65,252	...	....
IV. Africa.....	16,450	25,159	...	....
V. Australia.....	18,217	20,133	0.6	298
Total.....	199,247	657,303	...	....
Total 1910.....	188,368	640,032	...	....

This table demonstrates that less than one-third (30.3%) of the railway mileage of the world has been nationalized. In Europe, where a majority of the mileage is state owned, they have only 5.6 miles of line per 100 square miles of area; whereas in the United States we have over eight miles. In relation to population we have a mile of railway to less than 400 inhabitants, whereas in Europe they provide only one mile of line to every 2,083 inhabitants. If the European ratio to population prevailed in this country, we would have less than 45,000 miles of line instead of 250,000.

MILEAGE AND TRACKS OF BRITISH RAILWAYS.

The slow growth of British railways since 1900 is shown in the next summary, compiled from returns to the British Board of Trade:

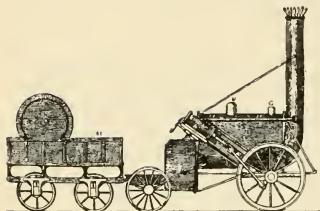
MILES OF TRACK OF BRITISH RAILWAYS, 1912 TO 1900.

Description of Track	1912	1911	1910	1909	1908	1905	1900
Single track (miles).....	23,447	23,425	23,389	23,280	23,209	22,870	21,855
Second track.....	13,237	13,207	13,189	13,121	13,048	12,819	12,162
Third track.....	1,544	1,520	1,517	1,500	1,435	1,324	898
Fourth track.....	1,208	1,200	1,192	1,175	1,141	1,067	729
Fifth track.....	250	238	236	230	208	170	73
Sixth track.....	149	142	143	138	122	97	36
Seventh track.....	69	67	70	67	59	40	10
Eighth to 22d tracks.....	130	120	115	111	94	44	2
Sidings.....	14,875	14,660	14,460	14,350	14,353	13,891	13,069*
Total trackage.....	54,909	54,576	54,311	53,972	53,669	52,322	48,834

*Sidings for 1900 computed from returns for 1903.

Here it appears that between 1900 and 1912 only 1,592 miles of line were added to the railway mileage of the British Isles. In the meantime the paid-up capital increased \$774,000,000, or over \$480,000 per added mile.

II EQUIPMENT



STEPHENSON'S ROCKET, 1829.
From a contemporaneous cut

Other things — main track, auxiliary track and terminal facilities — being sufficient, the ability of a railway system to meet the obligations of its public service depends on the capacity of its rolling stock. Between individual companies the surplus equipment of one road can make good the shortage of others, but,

as a system, the railways of the United States have no accommodating neighbor to borrow from, unless it be Canada.

Seven years ago the traffic demands of the republic had overtaken and overwhelmed the equipment of American railways, as was evidenced by a reported shortage of 150,000 freight cars in February, 1907. This condition continued in a modified degree throughout the year until December, when business reaction came to the relief of the overtaxed roads. What provision has been made to prevent a recurrence of such a condition may be studied in the following table compiled by the *Railway Age-Gazette* from the reports of locomotives and cars constructed in the United States since 1899:

SUMMARY SHOWING THE NUMBER OF CARS AND LOCOMOTIVES BUILT DURING THE YEARS 1899 TO 1913.

Year	Locomotives	Number Passenger Cars	Freight Cars
1913†.....	5,332	3,296	207,684
1912†.....	4,915	3,060	152,429
1911*.....	3,530	4,246	72,161
1910*.....	4,755	4,412	185,357
1909*.....	2,887	2,849	96,419
1908*.....	2,342	1,716	76,555
1907*.....	7,362	5,457	284,188
1906*.....	6,952	3,167	243,670
1905*.....	5,491	2,551	168,006
1904.....	3,441	2,144	60,806
1903.....	5,152	2,007	153,195
1902.....	4,070	1,948	162,599
1901.....	3,384	2,055	136,950
1900.....	3,153	1,636	115,631
1899.....	2,475	1,305	119,886
Total.....	65,241	41,849	2,235,536

*Includes Canadian output.

†Includes Canadian output and equipment built in railroad shops.

It will be perceived that in no year since 1907 has there been any approach to the activity in providing equipment that responded to the extraordinary demands of that year.

If the reader will refer to the figures of equipment now in service on subsequent pages, he will find that the total of locomotives, passenger cars and freight cars built since 1899 approaches the number reported in service on June 30, 1913. From this he can infer that the equivalent of the rolling stock on hand in 1899 has passed out of



To test the security of a steel car against fire, 200 pounds of shavings and wood saturated with oil were burned in this solid steel passenger car, causing damage only to the paint and upholstery.

existence and, numerically at least, been replaced by more modern equipment. It also indicates that approximately 5% of the locomotives and freight cars go to the scrap heap every year. Passenger cars apparently are longer lived.

Of the locomotives built in 1913, the government reports that 491 valued at \$4,475,429 were exported. No locomotives have gone to Argentina since 1911, when eight were exported valued at \$12,156 a piece. The majority of locomotives exported are little more than half as large as those built for American roads.

The next summary gives the number, tractive power and weight of steam locomotives since the Commission has included their capacity in its reports:

**SUMMARY SHOWING NUMBER, POWER AND WEIGHT OF LOCOMOTIVES
IN THE UNITED STATES DURING THE YEARS 1913 TO 1902.**

Year	Number	Tractive Power (Pounds)	Weight without Tender (Tons)	Average Weight (Tons)
1913 Reported to Bureau.....	63,198	1,907,899,088	5,172,213	81.8
1912 " " ".....	60,890	1,758,337,381	4,790,645	78.7
1911 Official	*60,162	1,681,495,905	4,537,653	75
1910 "	*58,240	1,588,894,480	4,224,208	73.5
1909 "	*56,468	1,503,971,444	4,056,733	72.0
1908†	56,867	1,498,793,551	4,012,553	71.0
1907 "	55,388	1,429,626,658	3,828,045	69.1
1906 "	51,672	1,277,865,673	3,459,052	66.9
1905 "	48,357	1,141,330,082	3,079,673	63.6
1904 "	46,743	1,063,651,261	2,889,492	62.1
1903 "	43,871	953,799,540	2,606,587	59.4
1902 "	41,225	839,073,779	2,323,877	56.3
Increase in eleven years to 1913...	53.3%	127.4%	122.5%	45.3%

*Excludes locomotives in service of switching and terminal companies and unclassified locomotives, also 435 Mallet locomotives in 1911.

†Excludes 831 unclassified locomotives, but includes 858 locomotives of switching and terminal companies.

EQUIPMENT PREVIOUS TO 1902.

To preserve the continuity of the statistics of equipment, as far as possible, the following table covers the reports to the Commission from its organization for locomotives and cars, irrespective of capacity:

	Locomotives	Passenger Cars	Freight Cars	Company Cars
1901.....	39,584	35,969	1,464,328	50,536
1900.....	37,663	34,713	1,365,531	50,594
1899.....	36,703	33,850	1,295,510	46,556
1898.....	36,234	33,595	1,248,826	43,753
1897.....	35,986	33,626	1,221,730	42,124
1896.....	35,950	33,003	1,221,887	42,759
1895.....	35,699	33,112	1,196,119	41,330
1894.....	35,492	33,018	1,205,169	39,891
1893.....	34,788	32,911	1,201,273	39,762
1892.....	33,136	28,876	966,998	36,901
1891.....	32,139	27,949	947,300	35,185
1890.....	30,140	26,820	918,491	32,895
1889.....	29,036	24,586	829,585	31,020

From this it appears that since 1889 there has been an increase of over 117% in the number of locomotives. As their average weight exclusive of tenders in the meantime has increased from 40 to over 80 tons, their capacity during the 24 years has undoubtedly increased over 330%. Their tractive power has probably increased in a still

greater proportion. It is only the increase in size and power that has enabled American railways to meet the transportation necessities of the American people.

PASSENGER AND FREIGHT CARS.

Passing from the number of passenger and freight cars shown in the last preceding table down to 1901, the following summary brings the data respecting them down to 1913, including the capacity of freight cars since 1902, when it was first reported to the Commission:

SUMMARY OF PASSENGER AND FREIGHT CARS, AND CAPACITY OF LATTER FROM 1902 TO 1913.

Year	Passenger Service	Freight Service			Company's Service Number
		Number	Capacity Tons	Average Tons	
1913 Reported to Bureau.....	50,849	\$2,260,495	88,466,818	39.1	119,819
1912 " " " ".....	50,152	2,192,987	82,189,152	37.5	113,392
1911 Official.....	*49,818	*2,195,511	81,083,688	37	114,006
1910 " " " ".....	*47,095	*2,135,121	76,864,356	36	108,115
1909 " " " ".....	*45,584	*2,071,328	73,137,546	35	99,090
1908 " " " ".....	*45,117	†2,096,522	73,086,522	35	96,762
1907 " " " ".....	43,973	1,991,557	67,216,144	34	91,064
1906 " " " ".....	42,282	1,837,914	59,196,230	32	78,736
1905 " " " ".....	40,713	1,731,409	53,372,552	31	70,749
1904 " " " ".....	39,752	1,692,194	50,874,723	30	66,615
1903 " " " ".....	38,140	1,653,782	48,622,125	29	61,467
1902 " " " ".....	36,987	1,546,101	43,416,977	28	57,097
Eleven years' increase†.....	37.5%	46.4%	103.8%	39.7%	109.8%

*Does not include cars in service of switching and terminal companies.

†Includes 11,067 cars of switching and terminal companies and excludes 4,550 cars for which complete returns were not secured.

‡Complete returns will increase these percentages.

§Of these, 1,074,025 were box and refrigerator cars with a capacity of 38,200,455 tons.

Taken in connection with the table giving the number of cars built annually this summary proves how large a proportion of new cars is required to replace those destroyed, worn out, or abandoned. Where over 3,000 new passenger cars were built, there was an increase of only 620 cars reported; and where over 200,000 new freight cars were built, the number reported showed an increase of only 63,576 cars. This indicates that it takes approximately 4.7% as many passenger cars and 6.2% as many freight cars as those already in service to make good the annual losses.

During the six years since 1907 there has been an increase of only

12% in freight cars and 31% in their capacity, against 31% and 54%, respectively, for only five years preceding 1907.

It is the condition demonstrated by these figures that causes thoughtful railway managers to regard a return to normal traffic demands with something akin to trepidation.

STEEL PASSENGER CAR EQUIPMENT.

Last August (1913) the Special Committee on Relations of Railway Operation to Legislation issued a bulletin giving the number of steel and steel under-frame passenger cars in service and an approximation of what it would cost to replace the remaining wooden equipment with steel. After showing that the construction of wooden equipment in the United States had practically ceased (only 3.3% of that building in 1913 being wood), the Committee gave the following approximation of cars in service:

STEEL PASSENGER CARS IN SERVICE.

	Steel	Steel Under-frame
January 1, 1909.....	629	673
January 1, 1910.....	1,117	1,098
January 1, 1911.....	3,133	1,636
January 1, 1912.....	5,347	2,399
January 1, 1913.....	7,271	3,296
Increase 1913 over 1909.....	6,642	2,623
Per cent of increase.....	1.055%	389%

The Committee further furnished a summary giving an approximation of what it would cost to replace the remainder of the passenger equipment with steel cars, as follows:

COST OF REPLACING WOODEN CARS WITH STEEL.

	Number	Average Cost	Amount
Postal.....	680	\$11,000	\$7,480,000
Mail and baggage.....	2,724	10,000	27,240,000
Mail, baggage and passenger.....	679	10,000	6,790,000
Baggage and passenger.....	3,757	10,000	37,570,000
Baggage or express.....	7,431	8,500	63,163,500
Passenger.....	23,692	12,800	303,257,600
Parlor, sleeping, dining.....	6,864	22,000	151,008,000
Business.....	774	15,000	11,610,000
Motor.....	325	20,000	6,500,000
Total.....	46,926	.....	\$614,619,100

According to this the cost of replacing the present passenger service equipment with steel or steel under-frame cars will be approximately \$13,000 per unit. As the steel postal cars with which all railways must be equipped by 1915 cost about \$12,000 apiece, the above estimate is evidently a conservative one.

COST OF ALL RAILWAY EQUIPMENT.

This brings us to a consideration of the cost of all railway equipment. As shown in the first summary under this title, practically all American railway equipment is modern. In the process of renovation and replacement four-fifths of the locomotives, three-quarters of the passenger cars, and four-fifths of the freight cars have been bought since 1899. Each year the average cost of all locomotives approaches the average sales price of one of the largest manufacturers in 1911, viz., \$18,270 per engine. It is within the mark to place their average cost at \$16,000. A fair estimate for wooden passenger equipment is \$6,500 per car, for freight cars \$1,000, and for company's cars \$600. Accepting these figures we arrive at the following approximation of the

COST OF ALL EQUIPMENT.

(240,500 MILES REPRESENTED)

63,198 locomotives @ \$16,000.....	\$1,011,168,000
10,567 steel passenger cars @ \$12,000.....	126,804,000
40,282 wooden passenger cars @ \$6,500.....	261,833,000
2,260,495 freight cars @ \$1,000.....	2,260,495,000
119,819 company cars @ \$600.....	71,891,400
Total cost of equipment.....	\$3,732,191,400

The cost of American passenger cars alone would purchase the entire railway system of Switzerland; the cost of American locomotives alone would pay for all the railroads of Belgium, Sweden, Nor-

way, and Denmark; the cost of American freight cars alone would buy the state system of Italy and Hungary with that of Holland thrown in, and the cost of all American rolling stock would pay for the entire French railway system — private and state — and in each case the American trader would get the worst of the bargain.

The mere maintenance and replacement of the three and three-quarter billion dollar investment in equipment cost over \$520,000,000 in 1913. If 4% is a reasonable allowance for yearly depreciation, the reader will perceive that nearly \$150,000,000 of this amount was required to take care of this account alone. In fact, the annual replacements of locomotives, passenger cars, and freight cars figure out more nearly \$165,000,000. If either of these sums be deducted from the total cost of maintenance of equipment it would leave at most only \$370,000,000, from which the million dollar a day efficiency theorists would save \$365,000,000!

EQUIPMENT BY I. C. C. GROUPS.

In 1913 the Bureau has endeavored for the first time to assign railway equipment according to the territorial groups established by the Interstate Commerce Commission in 1893 and for some unaccountable reason abandoned in 1911. While the assignments are necessarily more or less arbitrary, they are no more so for ten groups than for three.

With this fact in mind the following summary of assignment by groups compared with the last assignment made by the Commission is submitted:

SUMMARY SHOWING ASSIGNMENT OF EQUIPMENT BY TERRITORIAL GROUPS FOR THE YEARS ENDING JUNE 30, 1913 AND 1910.

Territory Covered	Locomotives		Cars Passenger Service		Cars Freight Service	
	1910 Official	1913 Bureau	1910 Official	1913 Bureau	1910 Official	1913 Bureau
Group I.....	3,297	3,183	5,356	5,063	83,091	82,483
Group II.....	13,607	13,697	12,281	13,361	516,299	515,930
Group III.....	8,994	9,990	5,593	6,099	402,915	428,902
Group IV.....	3,102	4,064	2,097	2,255	123,831	163,764
Group V.....	4,700	4,676	3,403	3,354	170,786	168,114
Group VI.....	10,707	10,746	7,611	7,727	428,353	394,111
Group VII.....	2,480	3,648	1,688	2,952	74,166	122,061
Group VIII.....	5,971	6,980	3,874	4,732	189,138	218,328
Group IX.....	2,427	2,327	1,506	1,378	60,015	58,228
Group X.....	3,662	3,887	3,686	3,928	86,527	108,574
United States.....	*58,947	63,198	*47,095	50,849	*2,135,121	2,260,495

*Exclusive of equipment of switching and terminal companies, included in Bureau's figures.

While certain divergences are apparent throughout this table, due to the differences in assignment, the general result indicates clearly the distribution of railway equipment and the territory in which the increase has been greatest. The very differences illustrate the necessity and value of continuity in statistics. By careful revision of its assignments the Bureau hopes to bring this table more in line with the valuable series of the Commission from 1893 to 1910 inclusive.

NUMBERS OF DIFFERENT CLASSES OF FREIGHT CARS.

The numbers of the several classes into which cars are divided as reported to the Commission since 1902 are shown in the next statement:

Year	Box Cars	Flat Cars	Stock Cars	Coal Cars	Tank Cars	Refrigerator Cars	Other Cars
1911.....	990,313	153,300	77,590	853,699	7,787	31,786	80,856
Average capacity in Tons.	34	33	30	42	39	30	39
1910.....	966,577	153,918	77,584	878,689	7,434	30,918	78,411
1909.....	941,533	154,630	73,494	792,291	6,630	28,204	74,556
1908.....	950,209	159,749	76,219	805,185	6,888	27,930	70,054
1907.....	904,821	156,860	69,997	746,670	5,972	33,617	68,080
1906.....	843,118	146,908	64,202	686,717	5,324	31,782	55,584
1905.....	802,964	146,050	62,988	632,171	4,918	26,844	51,685
1904.....	780,445	147,226	64,270	622,568	4,520	22,735	46,577
1903.....	765,820	154,074	61,790	595,963	4,421	21,454	47,093
1902*.....	708,861	142,303	57,668	534,448	3,533	18,222	40,957
Average capacity in Tons.....	27	26	25	31	30	26	27

*Exclusive of 40,109 cars for which complete returns were not secured, a condition which did not recur subsequently.

In 1913 the returns to the Bureau show 1,074,025 box and refrigerator cars, a gain of 50,926 over the aggregate for 1911 shown in the above table. The capacity of these cars in 1913 was 38,200,455 tons, or an average of nearly 35.6 tons.

GERMAN FREIGHT CAR EQUIPMENT.

It will be of interest to compare the freight car equipment of American railways just given with the following summary of that of the government owned and operated railways of Germany during practically the same period:

NUMBER AND AVERAGE CAPACITY OF GERMAN FREIGHT CAR EQUIPMENT.

Year	Covered Wagons		Uncovered Wagons		Total Freight Wagons	
	Number	Capacity Average Tons	Number	Capacity Average Tons	Number	Capacity Average Tons
1911.....	183,602	13.78	413,161	14.26	596,763	14.11
1910.....	171,937	13.56	394,003	13.74	565,940	13.68
1909.....	163,829	13.44	378,424	13.56	542,253	13.52
1908.....	159,102	13.38	362,644	13.36	521,746	13.36
1907.....	152,753	13.26	345,170	13.16	497,923	13.20
1906.....	141,946	13.08	325,118	12.98	467,064	13.02
1905.....	134,763	12.92	307,611	12.82	442,374	12.86
1904.....	125,498	12.62	300,580	12.72	426,078	12.68
1903.....	122,027	12.42	295,388	12.62	417,415	12.56
1902.....	122,516	12.34	291,210	12.52	413,726	12.44
1901.....	122,059	12.14	288,114	12.42	410,108	12.34

Of the total freight car equipment of German railways in 1911 only 13,644, or 2.3%, had more than two axles and only 34.6% of all freight and baggage cars had brakes of any description.

From the above it will be seen that the German freight car equipment in 1911 had a carrying capacity of only 8,419,325 tons against 88,466,818 for American railways in 1913. In other words, the private railways of the United States provide nearly one ton of freight car capacity per capita of population, where the state railways of Germany provide only one-seventh of a ton per inhabitant. No wonder that in 1911 and 1912 there was a shortage of cars in Germany such as has never been known in this country, resulting, as the *Zeitung des Vereins Deutscher Eisenbahnverwaltungen* reported, in "the closing of certain mines and the suspension of operations in certain manufacturing works more or less completely."

GERMAN LOCOMOTIVES AND PASSENGER CARS.

German locomotives in 1911 numbered 27,693 of which one has been in service since 1858, one each since 1862 and 1863, six since 1864 and a steadily rising number since every year subsequent. The average weight of German locomotives is 53.31 tons including the tender!

The German passenger car equipment is decidedly mixed. It consists of 59,857 cars, of which 24,574 have only two axles, 26,917 three axles, 8,023 four axles, and only 343 six axles. The division by classes of passengers, which is even more significant, in 1911 was as follows:

DISTRIBUTION OF GERMAN PASSENGER CAR EQUIPMENT TO CLASS OF TRAVEL IN 1910 AND 1911.

	1910	1911
Class I.....	135	134
Class I and II.....	6,323	6,220
Class I, II and III.....	1,369	1,370
Class II.....	3,005	3,210
Class II and III.....	5,736	6,044
Class II, III and IV.....	38	37
Class III.....	24,961	25,992
Class III and IV.....	483	510
Class IV.....	14,931	15,655
Special.....	663	685
Total.....	57,644	59,857

Notwithstanding prominence already, cars of lower class travel are the only ones to show gains!

SURPLUS OF AMERICAN FREIGHT CARS.

Where the German railways have been struggling with shortages American roads since November, 1907, have shown large average surpluses. This has been due to the depression in business rather than any adequate provision for a normal expansion in traffic. The following summary compiled from the reports of the Committee on Car Efficiency of the American Railway Association shows the freight car situation since January, 1907:

FREIGHT CAR SHORTAGES AND SURPLUS, BY MONTHS, FROM JANUARY, 1907, TO DECEMBER, 1913.

Month	1907 Shortage	1908 Surplus	1909 Surplus	1910 Surplus	1911 Surplus	1912 Surplus	1913 Surplus
January.....	110,000	342,580	333,019	52,309	110,432	102,479	53,230
February.....	150,000	322,513	301,571	51,600	156,355	44,984	52,700
March.....		297,042	291,418	45,315	208,527	52,682	57,998
April.....	100,000	413,605	282,328	84,887	187,219	151,186	70,715
May.....	60,000	404,534	273,890	127,148	188,847	123,683	61,269
June.....	40,000	349,944	262,944	129,508	169,006	73,464	71,126
July.....	20,000	308,680	243,354	143,824	165,508	75,389	76,280
August.....	*15,000	253,003	159,424	105,564	108,000	58,623	69,253
September.....	*60,000	133,792	78,798	54,890	70,722	127,380	61,753
October.....	90,757	110,912	†35,977	33,735	48,854	122,810	37,198
November.....	57,003	132,829	39,528	34,581	45,290	126,135	46,059
December (surplus)	209,310	222,077	58,354	62,118	88,646	150,659	107,513

Boldface figures mark turning points or striking changes.

*In July and August, 1907, there was a net surplus.

†In October, 1909, the surplus in one section was offset by a shortage in another section.

‡From September to December, 1912, these surpluses were offset by slightly larger shortages. Surpluses in 1914 were: January 15, 217,274; February 14, 199,385; and March 15, 132,010. The surplus of 243,354 in July, 1909, was the last surplus as great as January 15, 1914.

FREIGHT CAR PERFORMANCE.

The reports to the Committee on Relations between Railroads of the American Railway Association provide the data regarding freight car efficiency in the next summary:

SUMMARY SHOWING THE AVERAGE PERFORMANCE OF AMERICAN AND CANADIAN FREIGHT CARS DURING THE YEARS ENDING JUNE 30, 1913, 1912, 1911 AND 1909, AND AVERAGE CAR LOAD IN 1913 AND 1912.

Month Year End- ing June 30	Average Miles per Day per Car				Average Ton Miles per Car per Day				Average Tons per Loaded Car	
	1912-13	1911-12	1910-11	1908-09	1912-13	1911-12	1910-11	1908-09	1912-13	1911-12
July.....	23.2	21.9	22.8	20.0	362	317	323	275	22.5	21.1
August...	24.3	22.9	23.2	20.8	385	350	358	292	22.3	21.6
September	24.4	23.8	24.2	22.0	396	368	375	320	22.3	21.6
October...	26.0	25.0	24.8	23.8	433	382	376	346	22.9	21.1
November	26.0	24.4	24.3	23.5	424	376	385	341	22.8	21.9
December.	24.4	23.4	22.7	22.3	396	361	349	332	23.2	22.5
January...	24.3	20.4	22.1	20.9	392	325	331	293	23.6	22.8
February...	24.7	22.9	22.6	21.7	395	370	330	306	22.9	22.6
March....	23.7	24.5	23.2	22.7	374	389	332	330	22.7	22.4
April.....	24.0	23.3	23.3	22.4	369	340	317	310	22.2	21.2
May.....	25.0	23.7	23.7	22.5	387	350	338	304	22.6	21.7
June.....	24.3	24.1	22.9	22.4	377	366	338	314	22.5	21.8

The most cursory glance at this table reveals a most gratifying advance in freight car efficiency. Take any month in the calendar for 1908-09 and 1912-13 and the improvement is marked whether in average miles or ton miles per day per car, while the average tons per loaded car increased almost one ton in 1913 over 1912.

The car location reports to the American Railway Association for December 13, 1913, accounted for 2,252,105 freight cars, owned by 302 railway companies in the United States. At the same time there were 2,256,429 cars on the line, of which 1,220,680 were home cars on home roads and 1,035,749 were foreign cars on home roads. The total of these two exceeded the cars owned by 4,644. At the date of this report 166,388, or 7.38% of the cars owned, were in the shops, of which nearly 80% were home cars in home shops.

SAFETY APPLIANCES.

In the matter of safety appliances, American railways are more completely equipped than the railways of any other country. With those twin devices for the protection of trains and employes, train

brakes and automatic couplers, their equipment is practically complete — the proportions being 98% and 99.7% respectively.

BLOCK SIGNALS.

There is now a double track mileage in the United States operated under the Block Signal System nearly equal to the entire single track mileage of the British Isles. The latest figures compiled by the *Railway Age-Gazette* to the end of the calendar year 1913, compared with those for 1906, show the progress that has been made in this important branch of railway operation:

	1913			1906
	Single track (miles)	Two or more tracks miles	Total	Total
Automatic Block Signal.....	11,795	14,328	26,123	9,743
Increase over preceding year.....	.....	.....	3,827	.....
Non-Automatic Block Signals.....	52,732	8,330	61,062	43,390
Increase over preceding year.....	.....	.....	5,127	.....
Both classes.....	64,527	22,658	87,185	53,133
Increase over preceding year.....	.....	.....	8,954	.....
Increase in seven years.....	.....	.....	34,052	.....

As there has been an increase of less than 33,000 miles of line in the United States since 1907, the above table indicates that the installation of the Block System is proceeding more rapidly than the construction of new line. A special committee of the American Railway Association has estimated that it costs \$1,232 per mile to install block signals and \$169 per mile to maintain them. This would place the cost of installment to date at \$107,412,000, for single track alone, and over \$200,000,000 for that not equipped. These estimates do not provide for auxiliary track.

AUTOMATIC STOPS.

Little progress has been reported during the year in the search for a practicable automatic stop. Not only in the United States but throughout the world experiments are being made which it is hoped will put a perfect mechanical check on the imperfect human vigilance that to-day operates with amazing fidelity and success in the hundreds of thousands of cabs and signal boxes in all lands. How to shift any of the responsibility for safety from the man to any mechanical

contrivance without impairing the vigilance of the man holds the whole question in abeyance. It is a wisely considered case of letting "I dare not" wait upon "I would."

Recently (Dec. 19, 1913) the London *Engineer*, in discussing a proposal to invest the British Board of Trade with absolute power to compel railways to adopt automatic safety devices, said:

We find ourselves wondering sometimes if Mr. Thomas and others who would like to see the Board given absolute power ever consider on whom, if an accident happened in spite of the adoption of such recommendations,—and accidents unquestionably would happen,—the responsibility would rest? Mr. Thomas has taken it away from the driver and firemen, but if the automatic plant fails some one is to blame, and the fault has to be laid on another man's shoulders. Is it not better, we ask, to make the driver and firemen responsible for their train than to take their charge out of their hands and give it to a man who has a far less immediate interest in it? Yet this is what we should do if we adopted the automatic control of engines. The driver and firemen would no longer keep a keen lookout on their signals, being confident in the belief that the automatic gear would pull them up in the event of an error on their part, and when an accident did happen, as it surely would, they would hold themselves exonerated from blame by the apparatus, whilst the man in charge of the latter would find a score of persons and causes to relieve him of his responsibility. Furthermore, if the automatic control had been fitted by command of the Board of Trade and had passed its inspectors and received its approval, would it be fair to put the blame on a railway company which had adopted the system under protest? Under such circumstance the Board of Trade would be rightly held responsible for the accident. Would it, then, pay compensation for casualties and repair the broken stock of the companies?

The same questions may be asked of the Interstate Commerce Commission in the United States.

III

EMPLOYES AND THEIR COMPENSATION

Number 1,910,000

Pay \$1,439,000,000

Between 1907 and 1913 the traffic of the railways measured by their transportation revenues increased about 22%. In the meantime the number of their employes increased only 10.6%, but the compensation of these employes increased over 30%. This means that in proportion to the public service they perform the railways of the United States are undermanned, whereas in proportion to the revenues earned their employes are overpaid or the railways themselves are underpaid.

According to the returns to this Bureau there were 749 employes per 100 miles of line in 1913 against 735 officially reported in 1907, but the pay-roll in 1913 was \$5,673 per mile of line against only \$4,711 in 1907. It is this latter fact in connection with the gradual increase in the investment per mile of line that makes the "per mile of line" such an illusive factor in judging of the financial results of railway operation. Unless revenues increase in a ratio to correspond with the increase in wages the railways must inevitably experience hard times. And that condition is precisely what they are suffering from now.

THE STATISTICS OF EMPLOYES IN 1913.

The 433 companies reporting to this Bureau had 1,814,047 persons in their employ on June 30, 1913, or 144,238 more than were reported to the Commission in 1911 and within 34,836 of the total given as the result of a special inquiry by the Commission last June. In 1913 there were also 59,162 persons employed in the so-called "outside operations" of the railways, bringing the total employed by 433 companies up to 1,873,061. From these corroborative figures it appears that there were over 1,910,000 persons directly in the employ of the railways of the United States last year.

Turning to the compensation of this great industrial army, the pay-roll of the companies reporting to this Bureau amounted to \$1,373,420,654; or, including outside operations, \$1,401,211,961. This makes it safe to estimate the compensation of all railway employes in the United States at fully \$1,439,000,000.

This pay-roll absorbs over 44% of railway revenues and constitutes more than 63% of their operating expenses. Successive awards of

arbitrators have demonstrated the impotence of railway managers to keep the labor unit within reasonable economic bounds.

The average daily compensation paid per man rose from \$2.44 in 1912 to \$2.49 in 1913, the latter figure showing an advance of 20% over 1905, when the Bureau began compiling the information. This 20% increase in the wage rate means that in 1913 the railways paid \$225,000,000 more for labor than would have been paid for the same number of days worked under the 1905 scale.

The aggregate number of days worked by the employes of the 433 companies reporting in 1913 was 551,134,689, or 304 days per person, against 508,732,152 in 1912, when the average per man was 301 days. These averages are not strictly accurate, because the number of employes is not an average for the year.

The first summary under this title gives the number, compensation and average pay of the several classes of employes of the roads reporting to the Bureau for the year 1913, together with the aggregate reported to the Commission for preceding years.

SUMMARY OF RAILWAY EMPLOYEES, COMPENSATION AND RATES OF PAY PER DAY BY CLASSES IN 1913, AND AGGREGATES FROM 1889 TO 1913.

1913 (242,177 miles represented) Class	Number	Per 100 Miles of Line	Compensation		
			Total	Average Pay per Day	Per Cent of Gross Revenues
General Officers.....	3,815	1.5	\$19,283,828	\$15.78	0.6
Other Officers.....	10,558	4.3	23,184,973	6.46	0.7
General Office Clerks.....	84,000	34.7	69,505,735	2.52	2.2
Station Agents.....	38,091	15.7	29,729,152	2.28	1.0
Other Stationmen.....	168,709	69.7	107,369,339	1.96	3.4
Enginemen.....	66,366	27.4	111,310,188	5.24	3.6
Firemen.....	70,497	29.1	67,210,665	3.16	2.2
Conductors.....	52,062	21.5	73,278,800	4.43	2.3
Other Trainmen.....	146,888	60.7	139,970,677	3.06	4.5
Mechanists.....	60,709	25.1	60,056,702	3.28	1.9
Carpenters.....	78,605	32.5	61,394,209	2.64	2.0
Other Shopmen.....	271,060	112.0	189,833,034	2.29	6.1
Section Foremen.....	44,438	18.4	32,677,518	2.13	1.0
Other Trackmen.....	374,441	154.7	155,953,526	1.58	5.0
Switch Tenders, Crossing Ten- ders and Watchmen.....	38,725	16.0	22,751,826	1.72	0.7
Telegraph Operators and Dis- patchers.....	43,036	17.8	36,519,605	2.52	1.2
Employees acct. Floating Eqpt.	13,771	5.7	9,231,129	2.41	0.3
All other Employees and Laborers	248,276	102.5	164,159,748	2.15	5.3
Total 96% mileage represented	1,814,047	749.3	\$1,373,420,654	\$2.49	44.0
1912 Official Figures(c).....	1,699,218	707	\$1,243,113,173	\$2.44	43.9
1911 " ".....	1,702,164	687	1,230,186,019	(b) 2.42	43.7
1910.....	1,732,435	716	1,165,444,855	2.29	41.82
1909.....	1,528,808	638	1,005,349,958	2.24	41.00
1908.....	1,458,244	632	1,051,632,225	2.25	43.38
1907.....	1,672,074	735	1,072,386,427	2.20	41.42
1906.....	1,521,355	684	(a) 930,801,653	2.09	40.02
1905.....	1,382,196	637	839,944,680	2.07	40.34
1904.....	1,296,121	611	817,595,810	No data	41.36
1903.....	1,312,537	639	775,321,415	No data	40.78
1902.....	1,189,315	594	676,028,592	No data	39.28
1901.....	1,071,169	548	610,713,701	No data	38.39
1900.....	1,017,653	529	577,264,841	No data	38.82
1899.....	928,924	495	522,967,896	No data	39.81
1898.....	874,558	474	495,055,618	No data	39.70
1897.....	823,476	449	465,601,581	No data	41.50
1896.....	826,620	454	468,824,531	No data	40.77
1895.....	785,034	441	445,508,261	No data	41.44
1894.....	779,608	444	No data	No data	.....
1893.....	873,602	515	No data	No data	.....
1892.....	821,415	506	No data	No data	.....
1891.....	784,285	486	No data	No data	.....
1890.....	749,301	479	No data	No data	.....
1889.....	704,743	459	No data	No data	.....

(a) Includes \$30,000,000 estimate pay-roll of Southern Pacific, whose records were destroyed in the San Francisco disaster.

(b) Bureau computations.

(c) Exclusive of Class III and switching and terminal companies.

In studying the figures in the preceding table the reader should remember that the general advance which it reflects does not include any of the results of the arbitrations in the eastern territory, except that of the enginemen, which went into effect May 1, 1912, and two months for the firemen, which went into effect May 1, 1913. The conductors' and trainmen's award did not go into effect until last October.

In the case of the eastern enginemen, whose advance was effective throughout the year, the average daily pay increased from \$5.02 to \$5.24. This accounted for an increase of \$4,674,331 of the total increase of \$9,860,781 in the pay of enginemen.

The effect of the full crew laws is traceable in an increase of \$12,-685,499, or 9.9%, in the compensation of trainmen, where there was an increase of 8.4% in their number. This last figure should be compared with increases of 6.8% in the number of conductors, 6% in firemen and only 5% in enginemen. It is clear from these figures that the full crew laws have added approximately \$6,500,000 to the expenses of the railways without adding anything to their income. Moreover the consensus of operating opinion is that they have added nothing to the efficiency or safety of railway operation.

UNREMUNERATIVE EXPENDITURES.

The railway pay-roll for 1913 testifies that full crew laws are not the only external influence adding to the unremunerative expenses of the railways. Some of these are shown in the disproportionate increase in the pay of certain classes of employes between 1907 and 1913 in the next statement.

COMPENSATION OF CLASSES ESPECIALLY AFFECTED BY THE DEMANDS OF LEGISLATURES AND COMMISSIONS, 1913 AND 1907.

	1913 242,177 Miles Represented	1907 227,455 Miles Represented
Other Officers.....	\$23,184,973	\$15,012,226
General Office Clerks.....	69,505,735	48,340,123
Telegraph Operators and Dispatchers....	36,519,605	29,058,251
Employes account of Floating Equipment	9,231,129	6,035,415
Totals.....	\$138,441,442	\$98,446,015
Increase.....	\$39,995,427, or 40.6%	

In the meantime there was an increase of less than 6½% in the mileage represented and of only 20% in operating revenues. Had the

compensation of these four classes increased in the same ratio as revenues, and that ratio should decrease proportionately with the increase in traffic, there would have been a saving of over \$20,000,000 in expenses in 1913.

AVERAGE COMPENSATION 1913-1892.

The next statement presents in concrete tabular form one of the most convincing arguments in favor of continuity in statistics, even when some of the factors do not admit of scientific accuracy. For twenty-one years the Commission has called for the data given in this table on an identical form, and the results, if for comparative use alone, have justified its wisdom.

COMPARATIVE SUMMARY OF AVERAGE DAILY COMPENSATION OF RAILWAY EMPLOYEES, BY CLASSES, FOR THE YEARS ENDING JUNE 30, 1913, TO 1892.

Year	General Officers	Other Officers	General Office Clerks	Station Agents	Other Stationmen	Enginemen	Firemen	Conductors	Other Trainmen	Machinists	Carpenters	Other Shopmen	Section Foremen	Other Trackmen	Switchmen, Flagmen and Watchmen	Telegraph Operators and Despatchers	Employees Account Floating Equipment	All other Employees and Laborers
1913* Bureau	15.78	6.46	2.52	2.28	1.96	5.24	3.16	4.43	3.06	3.28	2.64	2.29	2.13	1.58	1.72	2.52	2.41	2.15
1912* "	15.22	6.45	2.50	2.23	1.90	5.02	3.03	4.29	3.02	3.27	2.57	2.25	2.09	1.50	1.73	2.46	2.32	2.13
1911† Official	12.99	6.27	2.49	2.17	1.89	4.79	2.94	4.16	2.88	3.14	2.54	2.24	2.07	1.50	1.74	2.44	2.34	2.08
1910† "	13.27	6.22	2.40	2.12	1.84	4.55	2.74	3.91	2.69	3.08	2.51	2.18	1.99	1.47	1.69	2.33	2.22	2.01
1909† "	12.67	6.40	2.31	2.08	1.82	4.44	2.67	3.81	2.59	2.98	2.43	2.13	1.96	1.38	1.73	2.30	2.31	1.98
1908† "	13.11	6.27	2.33	2.09	1.82	4.45	2.64	3.81	2.60	2.95	2.40	2.12	1.95	1.45	1.78	2.30	2.38	1.97
1907 "	11.93	5.99	2.30	2.05	1.78	4.30	2.54	3.69	2.54	2.87	2.40	2.06	1.90	1.46	1.87	2.26	2.27	1.92
1906 "	11.81	5.82	2.24	1.94	1.69	4.12	2.42	3.51	2.35	2.69	2.28	1.92	1.80	1.36	1.80	2.13	2.10	1.83
1905 "	11.74	6.02	2.24	1.93	1.71	4.12	2.38	3.50	2.31	2.65	2.25	1.92	1.79	1.32	1.79	2.19	2.17	1.83
1904 "	11.61	6.07	2.22	1.93	1.69	4.10	2.35	3.50	2.27	2.61	2.26	1.91	1.78	1.33	1.77	2.15	2.17	1.82
1903 "	11.27	5.76	2.21	1.87	1.64	4.01	2.28	3.38	2.17	2.50	2.19	1.86	1.78	1.31	1.76	2.08	2.11	1.77
1902 "	11.17	5.60	2.18	1.80	1.61	3.84	2.20	3.21	2.04	2.36	2.08	1.78	1.72	1.25	1.77	2.01	2.00	1.71
1901 "	10.97	5.56	2.19	1.77	1.59	3.78	2.16	3.17	2.00	2.32	2.06	1.75	1.71	1.23	1.74	1.98	1.97	1.69
1900 "	10.45	5.22	2.19	1.75	1.60	3.75	2.14	3.17	1.96	2.30	2.04	1.73	1.68	1.22	1.80	1.96	1.92	1.71
1899 "	10.03	5.18	2.20	1.74	1.60	3.72	2.10	3.13	1.94	2.29	2.03	1.72	1.68	1.18	1.77	1.93	1.89	1.68
1898 "	9.73	5.21	2.25	1.73	1.61	3.72	2.09	3.13	1.95	2.28	2.02	1.70	1.69	1.16	1.74	1.92	1.89	1.67
1897 "	9.54	5.12	2.18	1.73	1.62	3.65	2.05	3.07	1.90	2.23	2.01	1.71	1.70	1.16	1.72	1.90	1.86	1.64
1896 "	9.19	5.96	2.21	1.73	1.62	3.65	2.06	3.05	1.90	2.26	2.03	1.69	1.70	1.17	1.74	1.93	1.94	1.65
1895 "	9.01	5.85	2.19	1.74	1.62	3.65	2.05	3.04	1.90	2.22	2.03	1.70	1.70	1.17	1.75	1.98	1.91	1.65
1894 "	9.71	5.75	2.34	1.75	1.63	3.61	2.03	3.04	1.89	2.21	2.02	1.69	1.71	1.18	1.75	1.93	1.97	1.65
1893 "	.....	7.84	2.23	1.83	1.65	3.66	2.04	3.08	1.91	2.33	2.11	1.75	1.75	1.22	1.80	1.97	1.96	1.70
1892 "	.....	7.62	2.20	1.81	1.68	3.68	2.07	3.07	1.89	2.20	2.08	1.71	1.76	1.22	1.78	1.93	2.07	1.67

* Pay of general officers in 1912 and 1913 out of proportion because Bureau returns do not cover hundreds of small roads.

† Averages for these years do not include returns for switching and terminal companies.

NUMBER AND PAY OF EMPLOYES BY GROUPS.

In the following table an attempt is made to continue a very instructive series of tables which was discontinued by the Commission in 1911. It gives the number and compensation of railway employes by territorial groups:

SUMMARY OF NUMBER AND COMPENSATION OF RAILWAY EMPLOYES
IN THE UNITED STATES IN 1910 AND 1913 BY TERRITORIAL GROUPS.

Territory Covered	1913 242,177 Miles Represented		1910 240,830 Miles Represented	
	Number	Compensation	Number	Compensation
Group I.....	79,860	\$ 64,595,726	84,886	\$ 58,759,512
Group II.....	404,321	311,711,880	387,713	264,056,130
Group III.....	300,654	224,464,076	253,832	171,747,062
Group IV.....	103,211	72,567,518	79,515	45,052,511
Group V.....	143,217	97,254,069	143,742	87,902,233
Group VI.....	296,155	221,892,080	323,366	211,516,359
Group VII.....	107,539	84,909,299	65,464	49,781,295
Group VIII.....	184,948	140,927,820	162,514	112,816,427
Group IX.....	72,121	54,895,061	75,350	48,787,692
Group X.....	122,021	100,203,025	123,038	93,306,085
United States.....	1,814,047	\$1,373,420,654	1,699,420	\$1,143,725,306
Average per employe.....		\$757		\$673

Owing to the difference in assignments in 1913 and 1910 this table is not as satisfactory a summary of the changes in the several groups as could be wished, but it serves to reflect the trend in each group. The apparent increase of \$74 per year per man in the pay of employes in a rough way accounts for an addition of over \$150,000,000 to operating expenses. This is excessive because the average compensation per day accounts for an increase of slightly over \$110,000,000 by reason of the advance in wages since 1910.

RATIO OF PAY OF EMPLOYES TO REVENUES.

In the next statement the ratio of the aggregate compensation of railway employes to gross transportation earnings and to operating expenses is given for the past nineteen years:

SUMMARY SHOWING PROPORTION OF COMPENSATION OF EMPLOYEES TO GROSS EARNINGS AND OPERATING EXPENSES, AND OPERATING RATIO FOR NINETEEN YEARS, 1913 TO 1895.

Year	Ratio Compensation of Labor to Gross Earnings	Ratio Compensation of Labor to Operating Expenses	Ratio of Expenses and Taxes to Gross Earnings
1913 Bureau.....	44.05%	63.47%	73.54%
1912 ".....	44.20%	63.76%	73.54%
1911 Official.....	43.32%	63.10%	72.54%
1910 ".....	41.82%	62.75%	70.06%
1909 ".....	41.00%	62.06%	69.86%
1908 ".....	43.38%	62.33%	73.20%
1907 ".....	41.42%	61.41%	70.63%
1906 ".....	40.02%	60.79%	69.29%
1905 ".....	40.34%	60.40%	69.82%
1904 ".....	41.36%	61.07%	70.91%
1903 ".....	40.78%	61.65%	69.20%
1902 ".....	39.28%	60.58%	67.81%
1901 ".....	38.39%	59.27%	68.06%
1900 ".....	38.82%	60.04%	67.89%
1899 ".....	39.81%	61.04%	68.77%
1898 ".....	39.70%	60.52%	69.09%
1897 ".....	41.50%	61.87%	70.90%
1896 ".....	40.77%	60.39%	70.68%
1895 ".....	41.44%	61.38%	71.18%

Words are not needed to emphasize the story of these figures.

EUROPEAN RAILWAY LABOR.

The next table gives the number and pay of European railway servants as far as the information is available from official sources:

SUMMARY SHOWING NUMBER OF EMPLOYEES, COMPENSATION AND AVERAGE YEARLY PAY OF THE PRINCIPAL EUROPEAN COUNTRIES.

Country	Miles of Railway	Employees Number	Compensation per Year	Average per Year	Ratio to Revenues
*United Kingdom (1912).....	23,441	608,750	\$170,028,613	\$279	27.2
German Empire (1911).....	37,195	716,678	281,176,191	392	36.1
Austria (1911).....	14,104	276,943	89,051,382	322	41.9
Hungary (1911).....	13,012	136,334	39,505,486	299	37.0
Russia (1909).....	41,500	797,926	162,487,101	204	34.9
France (1908).....	24,915	442,709	115,125,400	260	34.4
Italy (state 1911).....	8,270	149,040	51,479,782	345	47.1
Switzerland (state 1907).....	2,944	41,973	12,473,826	297	31.9
†Denmark (state 1912).....	2,249	13,254	4,432,329	334	33.7
Roumania (1912).....	2,164	29,889	7,276,693	243	34.0
Belgium (state 1911).....	2,926	70,364	17,991,907	256	29.7

*Of British railway employees 43,584 are classed as boys. †Excludes laborers.

These figures are from the best available sources but outside of the German Empire, Austria, Hungary and Switzerland the returns are very incomplete.

PAY OF BRITISH RAILWAY EMPLOYEES.

The gradual improvement in British Board of Trade statistics has not yet reached the stage where they afford complete annual returns for all railway employees. Therefore, we have to rely on the following compilation by the *Railway News*, London, as to the number and compensation of the employees of the principal companies for a normal week.

Period	Number Employed in Selected Week	Amount Paid in Wages in Selected Week	Average Weekly Earnings per Head	
First week in December		£	s. d.	
1902.....	449,068	559,179	24	11¼ \$5.99
1903*.....	448,944	558,419	24	10½ 5.97
1904.....	446,197	558,416	25	0¼ 6.01
1905.....	449,923	568,852	25	3½ 6.07
1906.....	458,579	582,699	25	5 6.10
1907.....	479,314	618,734	25	9¼ 6.20
1908.....	459,753	574,455	25	0 6.00
1909.....	459,968	583,104	25	4¼ 6.09
1910.....	463,520	596,609	25	9 6.18
1911.....	473,168	631,321	26	8¼ 6.41
1912.....	482,905	660,196	27	4½ 6.65

*The second week in December, 1903.

It will be observed that these figures cover only 482,905 employees, when the last census of railway servants in 1911 showed a total of 608,750. Another census is due this year.

NUMBER AND PAY OF GERMAN RAILWAY EMPLOYEES.

Official statistics of the German Empire give the number and compensation of the four main classes into which railway employees are divided for the calendar year 1911, as follows:

SUMMARY SHOWING NUMBER AND PAY OF GERMAN RAILWAY EMPLOYEES FOR THE YEAR ENDING Dec. 31, 1911.

Division	Employees Number	Compensation Total	Average per Year	Increase over 1907
General Administration.....	32,798	\$ 26,949,307	\$822	\$69
Maintenance and Guarding Road.....	175,722	44,267,185	252	16
Station Service and Train Crews.....	312,239	127,280,685	408	48
Switching Crews and Shops.....	195,919	82,679,014	422	38
Total.....	716,678	\$281,176,191	\$392	\$39
Per Mile of Line.....	19.37			

EMPLOYES OF FRENCH RAILWAYS.

The official statistics of French railways give the number, but not the compensation of their employes, except for the department of "traction and materials." The figures for the years 1910 and 1911 follow:

	1910	1911
General Administration.....	3,257	3,241
Transportation and Traffic.....	149,050	153,165
Traction and Materials.....	97,660	102,178
Way and Structures.....	89,065	91,137
Auxiliaries and Laborers.....	87,006	82,164
Female Employes.....	30,619	30,705
Total.....	456,657	462,590

In the department of "traction et matériel" the compensation of employes was 110,441,016 francs, approximately \$21,315,116, or \$208.63 per employe per year, against \$187.50 in 1908.

EMPLOYES OF AUSTRIAN RAILWAYS.

While the number of employes on Austrian railways has declined since 1909, their compensation has gone on increasing. The figures for 1911 and the three preceding years are as follows:

	Number	Compensation	Average Pay
Appointed Staff, 1911.....	139,780	\$62,960,135	\$450
Laborers on daily pay, 1911.....	137,163	26,091,247	190
Total, 1911.....	276,943	\$89,051,382	\$322
Total, 1910.....	277,619	81,601,618	294
Total, 1909.....	279,034	77,230,083	277
Total, 1908.....	274,937	71,355,596	260

No wonder the Government has had to advance rates!

HUNGARIAN RAILWAY EMPLOYEES.

Hungarian railway employes in 1911 were distributed into divisions and classes as follows:

Branch of Service	Officials	Other Officers		Workmen	Total
		Male	Female		
General Administration.....	1,047	758	151	67	2,023
Track Inspection and Maintenance.....	1,096	11,885	7	34,828	47,816
Traffic Service.....	5,231	37,096	605	9,847	52,779
Train Dispatching and Workshops.....	1,041	11,957	13	18,623	31,634
Material and "Inventariendienst".....	302	542	5	1,233	2,082
Total, 1911.....	8,717	62,238	781	64,598	136,334
Total, 1910.....	8,882	60,013	732	61,318	130,945

In their pay a different classification prevails as follows:

Branch of Service	On the State Roads and Roads Worked by the State	On Private Roads Privately Worked	All Railways	Yearly Average
General Administration.....	\$ 882,531	\$ 357,029	\$1,239,560	\$613
Track Inspection and Maintenance.....	6,963,996	1,211,274	8,175,270	171
Traffic Service.....	15,239,060	2,333,312	17,572,372	333
Train Dispatching and Workshops.....	10,188,485	1,709,370	11,897,855	376
Material and "Inventariendienst".....	606,726	13,703	620,429	298
Total, 1911.....	\$33,880,798	\$5,624,688	\$39,505,486	\$299
Total, 1910.....	\$31,175,940	\$5,816,608	\$36,992,548	\$283

To meet this advance in pay the railways of Hungary have advanced their rates.

RUSSIAN RAILWAY EMPLOYEES.

Russian railway statistics for 1909 show that there has been quite a decline in the number and compensation of employes since 1907, as appears from the following summary:

Branch of Service	Number	Compensation	Average per Year
Russia in Europe—			
Officials and Regular Staff.....	307,326	\$67,657,353	\$221
Day Laborers.....	183,888	29,136,339	158
Russia in Asia —			
Officials and Regular Staff.....	58,371	15,636,013	268
Day Laborers.....	39,984	7,729,726	193
Private Companies —			
Officials and Regular Staff.....	128,942	29,430,616	228
Day Laborers.....	74,033	10,889,812	147
Total, 1909.....	792,544	\$160,479,859	\$202
Total, 1907.....	836,035	\$169,842,700	\$203

Note.—Excludes purely local roads among private companies.

In Russia, where the government fixes the rate of railway wages without consulting the employes, a reduction in the number of employes reduces the total compensation of labor proportionately.

SWISS RAILWAY EMPLOYES.

Since 1907 the official statistics of Switzerland have been content to give the number of railway employes, omitting their compensation either in aggregate or by divisions, which were both recorded for that year as follows:

1907 Division	Employees Number	Compensation (Total)	Average per Year
General Administration.....	1,631	\$ 793,043	\$486
Maintenance and Inspection of Way.....	10,308	1,483,030	144
Transportation and Train Service.....	17,815	6,937,260	389
Porters and Laborers.....	12,219	3,260,493	267
Total.....	41,973	\$12,473,826	\$297

In 1911 the number of employes had been reduced to 41,731, the decrease falling wholly in the divisions of Administration and Maintenance.

ITALIAN RAILWAY EMPLOYES.

In 1911 the government report furnishes the following information regarding the number and pay of Italian railway employes for that year.

Branch of Service	Number	Compensation	Average per Employee
General Administration.....	7,048	\$ 3,613,122	\$512
Movement and Traffic.....	57,022	21,230,623	372
Traction and Materials.....	37,677	16,159,076	429
Maintenance and Guarding.....	47,293	10,476,961	222
Total.....	149,040	\$51,479,782	\$345
Per Mile of Line.....	18		

These figures of the number and pay of Italian railway employes will come as a surprise to those students under the impression that they were among the lowest paid railway employes in Europe. In average compensation they apparently rank next to the German average, although the investigations of the British Board of Trade in 1908 found certain classes of Italian railway employes working for as low as 40 cents a day.

DANISH STATE RAILWAY EMPLOYES.

Details in regard to the number and pay of Danish railway em-

ployes are even more meager, as appears from the following statement for the state railways:

Branch of Service	Number	Compensation	Average per Employee per Year
General Direction.....	164	.....	.....
Traffic Department.....	5,694	.....	.....
Road Department.....	2,593	.....	.....
Mechanical Department.....	4,545	.....	.....
Accounting Department.....	258	.....	.....
Total.....	13,254	\$4,432,329	\$334
Per Mile of Line.....	5.9	.....	.....

BELGIAN RAILWAY EMPLOYEES.

Official reports of the Belgian railways for the year 1911 are as follows:

Branch of Service	State Roads 2,926 Miles	Private Roads 243 Miles
Officials and Permanent Staff.....	10,462	1,179
Under Officials and Assistants.....	3,313	3,702
Laborers.....	56,589	
Total.....	70,364	4,881
Per Mile of Line.....	26.21	20.16

The average annual compensation of Belgian railway employes, including all allowances, does not exceed \$300 and the minimum for some classes is below 50 cents a day.

There is one very important fact that is emphasized by this review of the compensation of railway employes in Europe: the vast majority of them work for less than \$1.00 per day, where in the United States the average daily compensation is \$2.49. The high average pay of labor and the low average of freight rates are the marvels of American railway operation, upon which their detractors gnaw in vain.

RAILWAY EMPLOYEES IN JAPAN.

If the average pay of railway labor in Europe is from one-half to one-third the American rate, the average for Japan makes the European rate magnificent by comparison. In studying the next table the reader must be constantly reminded that the rate is *per month* and not per week:

	Number	Monthly Salary	Average per Capita
Higher Grade			
Chokunin Rank.....	21	\$ 3,329	\$158.52
Sonin Rank.....	502	34,327	68.88
Lower Grade			
Clerks.....	{ *6	70	11.66
	{ 4,556	98,755	21.68
Asst. Engineers.....	2,156	56,437	26.18
	{ *609	2,737	4.49
Employees.....	25,197	247,973	9.84
	{ *2,534	6,774	2.67
Laborers	67,837	518,901	7.65
	*3,149	\$ 9,581	\$3.04
Total.....	100,269	959,722	9.57

* Female.

Only in India and China do railway employes receive as low an average compensation as is here set forth. The total compensation of Japanese labor per annum amounts to less than 23% of the gross revenues, and accounts for the low operating ratio of that country.

THE COST OF LIVING.

Underlying every demand, conference, and arbitration that has steadily advanced the average cost of railway labor in the United States for more than a decade has been "The Cost of Living." It matters not which is the cause, high wages or high prices, the evidence is that they have gone hand in hand and the railways, unable to "pass the buck" in the elegant phrase of the day, have had to see their own cost of living advancing without being able to adjust their prices to meet the exigency of the bare cost of living. For the last six years the railways have been putting a brave face on a most distressful situation. They have practiced economies to meet the high cost of their living which, if practiced by individual citizens and employes, would have brought the cost of living back to income instead of engaging in an exhausting race to bring income up to the high cost of living.

WHAT THE OFFICIAL FIGURES SHOW.

That there is no theory but hard uncompromising fact about the soaring cost of living is proved by the latest Bulletin of the Bureau of Labor on "Retail Prices from 1890 to 1913." The table from this shows the retail prices of fifteen articles on the following pages constituting two-thirds of the expenditure for food by the average workingman's family, covering a period of 23 years:

RELATIVE RETAIL PRICES OF THE PRINCIPAL ARTICLES OF FOOD

[Average price for 1890-1899=100.0. The relative prices shown in this report for 1890 to 1907 do

Year or Month	Sirloin Steak	Round Steak	Rib Rpast	Pork Chops	Bacon, Smoked	Ham, Smoked	Lard, Pure
1890.....	99.3	97.6	98.7	96.5	96.5	98.3	98.5
1891.....	99.7	98.0	99.6	98.8	97.2	99.5	100.0
1892.....	99.6	98.0	99.6	101.1	99.9	101.5	104.4
1893.....	99.4	98.5	98.4	105.0	108.9	107.1	119.2
1894.....	98.1	97.4	97.9	100.9	102.5	101.7	106.4
1895.....	98.7	98.2	97.9	99.7	98.7	98.9	99.8
1896.....	98.8	100.5	99.4	97.8	96.3	96.5	92.1
1897.....	99.6	101.8	100.1	97.5	97.0	98.5	89.0
1898.....	102.1	102.8	122.2	99.7	100.2	97.2	93.5
1899.....	104.4	107.0	106.1	103.2	102.9	100.5	97.1
1900.....	107.1	109.8	109.3	108.9	110.3	106.9	104.9
1901.....	109.4	114.0	112.7	119.0	121.3	111.1	119.6
1902.....	114.6	122.3	118.6	127.8	135.9	120.6	135.6
1903.....	110.6	116.8	117.0	126.1	140.4	122.1	126.0
1904.....	111.0	120.8	117.0	123.1	138.5	119.4	116.3
1905.....	110.6	120.0	116.2	125.0	139.3	119.4	115.8
1906.....	114.2	124.4	120.5	135.9	150.5	127.8	127.3
1907.....	116.7	128.4	123.0	140.9	157.7	131.0	135.5
1908.....	119.9	135.5	126.7	144.6	163.2	133.8	134.3
1909.....	126.1	140.6	132.2	58.7	176.4	142.1	150.5
1910.....	134.0	149.9	137.7	178.3	24.4	159.4	172.9
1911.....	134.9	152.6	138.6	170.3	197.2	155.9	145.3
1912.....	153.0	174.3	155.5	187.8	199.0	160.4	154.3
1912							
January.....	137.1	154.1	140.7	164.0	18.1	151.1	141.2
February.....	137.7	155.3	141.7	157.6	183.5	150.5	141.1
March.....	140.1	158.1	143.6	166.3	183.3	150.9	141.2
April.....	146.9	167.3	150.4	185.6	190.2	155.3	145.6
May.....	157.3	179.9	160.5	188.2	195.5	159.7	152.6
June.....	159.5	184.0	163.8	186.0	196.7	161.3	155.3
July.....	160.4	184.2	162.2	188.5	197.6	162.1	155.3
August.....	162.7	186.9	163.6	205.4	200.3	163.4	157.1
September.....	162.0	184.5	161.7	217.4	208.8	166.3	161.5
October.....	159.9	182.2	160.6	218.6	215.6	168.8	167.0
November.....	156.5	177.5	158.9	196.4	216.0	168.6	167.2
December.....	155.8	178.0	157.8	179.9	214.3	167.0	165.9
1913							
January.....	160.3	183.1	161.6	189.0	210.8	167.4	161.7
February.....	160.8	184.5	162.7	189.4	211.6	169.1	162.3
March.....	166.2	191.2	168.1	203.6	217.2	174.0	164.5
April.....	172.7	199.1	173.4	218.0	222.9	178.1	166.8
May.....	173.6	199.7	173.5	211.9	224.5	179.8	166.7
June.....	175.2	202.5	175.0	211.0	228.5	184.0	166.5
July.....	179.0	207.3	175.9	220.4	235.5	189.6	167.7
August.....	179.3	208.4	176.5	224.5	238.0	192.2	169.8
September.....	174.5	207.7	175.3	231.0	236.0	190.4	169.5
October.....	173.1	205.7	174.8	232.4	233.3	186.7	168.7

In a summary of this table the Bureau of Labor places the average relative price of the fifteen articles of food at 174.6 and of the same articles in proportion to their average consumption in workingmen's families at 170.9, both of which touch the highest marks recorded respectively.

In a note to the report on the retail price of bread, Labor Commis-

IN THE UNITED STATES, 1890 TO OCTOBER, 1913, BY ARTICLES.

not exactly agree with those shown in Bulletin 77 because a smaller number of cities are included.]

Hens	Flour, Wheat	Corn Meal	Eggs, Strictly Fresh	Butter, Creamery	Potatoes, Irish	Sugar, Granu- lated	Milk, Fresh	Year or Month
102.8	110.2	101.3	100.3	99.2	109.0	120.8	100.4	1890
104.8	112.4	111.5	105.6	105.7	117.1	103.1	100.5	1891
104.2	104.0	107.7	105.3	106.8	95.4	96.9	100.5	1892
104.3	95.1	104.0	105.5	108.6	111.8	102.6	100.5	1893
98.2	88.3	104.4	97.4	102.0	101.8	95.2	100.3	1894
97.3	89.6	101.0	98.8	97.4	90.6	91.8	99.4	1895
96.1	94.2	92.8	90.3	93.1	78.8	96.2	100.1	1896
92.3	104.7	91.2	94.0	93.7	92.5	94.3	100.0	1897
96.8	106.9	92.9	97.9	95.8	103.9	99.7	99.8	1898
103.4	94.8	92.9	101.6	97.6	98.8	99.6	98.8	1899
99.6	94.6	95.6	99.1	101.2	92.8	103.9	100.0	1900
105.0	94.9	107.6	107.7	103.0	114.0	102.1	101.4	1901
116.6	95.6	123.9	119.4	109.8	116.7	92.8	104.1	1902
119.3	102.1	122.1	125.1	110.2	114.7	93.7	107.4	1903
120.6	118.3	122.9	131.1	108.1	119.0	100.4	107.4	1904
123.6	118.6	123.5	131.3	111.4	109.3	101.8	108.1	1905
128.0	108.3	124.5	134.2	118.3	114.6	97.2	110.0	1906
131.3	118.2	133.5	138.2	127.3	122.2	98.7	118.9	1907
134.9	127.1	142.6	142.8	127.9	129.8	101.3	123.2	1908
145.7	138.1	145.7	154.7	134.3	133.4	100.0	126.2	1909
155.0	135.9	147.9	158.2	139.9	119.5	102.5	131.6	1910
151.6	127.9	147.2	150.2	131.3	157.0	111.1	132.7	1911
158.3	132.9	160.3	162.5	147.4	168.2	108.8	135.6	1912
151.4	130.1	152.9	202.9	166.9	177.8	115.1	134.8	1912
153.4	130.7	153.3	185.1	156.0	185.4	114.5	135.0	January
159.9	131.0	153.7	130.3	145.5	202.1	115.6	134.6	February
163.6	132.7	157.6	125.9	148.4	224.7	111.4	134.0	March
162.2	138.4	163.0	123.8	143.4	211.6	109.1	133.2	April
158.1	139.3	163.7	126.1	133.3	211.9	108.5	132.9	May
157.8	138.4	163.7	135.5	132.9	164.3	106.6	133.2	June
159.3	135.4	164.4	147.8	134.0	146.0	106.1	135.2	July
161.6	132.3	164.3	167.1	141.2	128.0	106.5	135.6	August
160.1	130.3	165.2	156.0	147.9	122.1	105.2	138.2	September
157.1	128.8	162.8	214.4	155.2	121.8	103.7	140.0	October
155.2	126.8	158.5	205.2	163.6	122.9	102.9	140.3	November
162.4	126.9	156.0	184.8	162.7	124.8	100.7	140.5	December
166.6	127.4	156.1	156.0	163.5	123.6	95.1	140.2	1913
172.8	127.2	155.2	131.3	165.2	120.5	93.9	139.5	January
79.7	127.2	155.1	126.4	161.3	119.2	92.7	139.3	February
179.3	127.8	156.0	132.5	144.0	125.8	92.3	138.6	March
176.8	128.6	157.3	140.8	141.3	144.4	92.0	138.4	April
175.6	128.8	157.7	149.4	139.8	174.2	95.2	138.3	May
173.2	127.9	160.0	166.4	141.9	175.2	97.7	138.8	June
174.2	127.8	165.0	191.2	151.3	179.4	99.4	140.3	July
172.1	126.9	168.0	212.4	153.3	173.8	95.9	141.9	August
								September
								October

sioner Royal Meeker says: "The following remarks accompanied bakers' reports of bread weights for October 15th, New York: 'Reduced weight of bread by one-half ounce, as it was found unprofitable, due to high cost of labor, to manufacture at former weight.'"

The retail price of coal for household use has advanced from 3% to 14% since 1907 according to locality.

The next table summarized from the preceding shows in brief the movement of retail prices during the past three years:

PER CENT OF INCREASE IN RETAIL PRICES ON OCT. 15, 1911, 1912 AND 1913, COMPARED WITH THE AVERAGE FOR THE 10-YEAR PERIOD, 1890 TO 1899, BY ARTICLES:

Article	Per Cent Increase in Price			Article	Per Cent Increase in Price		
	1911	1912	1913		1911	1912	1913
Sugar, granulated.	32.2	<u>5.2</u>	<u>*4.1</u>	Potatoes, Irish.	44.1	<u>22.1</u>	73.8
Flour, wheat.	29.5	30.3	<u>26.9</u>	Rib Roast.	37.9	60.6	74.8
Milk, fresh.	33.8	38.2	41.9	Ham.	57.4	68.8	86.7
Butter, creamery.	38.9	47.9	53.3	Round Steak.	51.7	82.2	105.7
Corn Meal.	51.2	65.2	68.0	Eggs, strictly fresh.	63.4	86.0	112.4
Lard, pure.	42.5	67.0	68.7	Pork Chops.	79.1	118.6	132.4
Hens.	47.3	60.1	72.1	Bacon.	93.2	115.6	133.3
Sirloin Steak.	33.9	59.9	73.1				

* Decrease.

Above arranged according to 1913 size of increase. Underscored figures, in *italics*, show prices lower than in previous years, i. e., breaks in upward climb. Double underscored, (4.1) in boldface showing sole decrease from 10-year average.

In Labor Bulletin No. 114, issued last June giving the "Wholesale Prices 1890 to 1912," we find the following grateful relief from the upward trend:

RELATIVE PRICES, 1912, COMPARED WITH AVERAGE 1890 TO 1899.

Article	Relative Price, December, 1912
Fruit, Apples, Evaporated, Choice.	78.3
" Prunes, California, in Boxes.	82.4
" Raisins, California, London Layer.	95.0
Bread: Crackers, Soda.	90.5
Meat: Mutton, Dressed.	94.8
Rice, Domestic, Choice.	97.0
Soda, Bicarbonate.	47.8
Tea, Formosa, Fine.	86.3
Vegetables, Fresh, Onions.	30.4
" " Potatoes, White.	95.7

WHOLESALE PRICES, 1890 TO 1912.

From the same source we take the next summary which shows in a broad way, through wholesale spectacles, the advance in pretty much everything that affects prices, whether in domestic purchases, or in railway construction, maintenance and equipment:

RELATIVE PRICES OF COMMODITIES BY YEARS, 1890 TO 1912, AND BY MONTHS IN 1912 BY GROUPS OF COMMODITIES.

Year or Month	Relative Price in 1890 to 1899—100							
	Farm Products	Food, etc.	Cloths and Clothing	Fuel and Lighting	Metals and Im- plements	Lumber and Building Material	House Furnish- ing Goods	Miscel- laneous
1890.....	110.0	112.4	113.5	104.7	119.2	111.0	111.1	110.3
1891.....	121.5	115.7	111.3	102.7	111.7	108.4	110.2	109.4
1892.....	111.7	103.6	109.0	101.1	106.0	102.8	106.5	106.2
1893.....	107.9	110.2	107.2	100.0	100.7	101.9	104.9	105.9
1894.....	95.9	99.8	96.1	92.4	90.7	96.3	100.1	99.8
1895.....	93.3	94.6	92.7	98.1	92.0	94.1	96.5	94.5
1896.....	78.3	83.8	91.3	104.3	93.7	93.4	94.0	91.4
1897.....	85.2	87.7	91.1	96.4	86.6	90.4	89.8	92.1
1898.....	96.1	94.4	93.4	95.4	86.4	95.8	92.0	92.4
1899.....	100.0	98.3	96.7	105.0	114.7	105.8	95.1	97.7
1900.....	109.5	104.2	106.8	120.9	120.5	115.7	106.1	109.8
1901.....	116.9	105.9	101.0	119.5	111.9	116.7	110.9	107.4
1902.....	130.5	111.3	102.0	134.3	117.2	118.8	112.2	114.1
1903.....	118.8	107.1	106.6	149.3	117.6	121.4	113.0	113.6
1904.....	126.2	107.2	109.8	132.6	109.6	122.7	111.7	111.7
1905.....	124.2	108.7	112.0	128.8	122.5	127.7	109.1	112.8
1906.....	123.6	112.6	120.0	131.9	135.2	140.1	111.0	121.1
1907.....	137.1	117.8	126.7	135.0	143.4	146.9	118.5	127.1
1908.....	133.1	120.6	116.9	130.8	125.4	133.1	114.0	119.9
1909.....	153.1	124.7	119.6	129.3	124.8	138.4	111.7	125.9
1910.....	164.6	128.7	123.7	125.4	128.5	153.2	111.6	133.1
1911.....	162.0	131.3	119.6	122.4	119.4	151.4	111.1	131.2
1912.....	171.3	139.5	120.7	133.9	126.1	148.2	113.7	133.2
1912								
Jan.....	171.6	140.7	115.3	125.8	121.0	145.1	113.0	127.8
Feb.....	171.7	140.3	115.7	128.4	121.0	144.3	113.0	129.9
Mar.....	179.8	142.3	117.4	128.7	121.4	145.0	113.4	132.7
Apr.....	189.0	146.5	119.1	133.6	122.5	146.0	113.6	134.3
May.....	189.8	144.7	120.4	134.0	123.4	146.6	113.6	136.6
June.....	176.6	143.2	121.1	132.4	124.2	146.8	113.6	134.5
July.....	171.3	142.0	121.7	133.5	152.8	149.5	113.6	132.3
Aug.....	164.1	138.4	122.6	133.0	126.9	150.4	113.6	132.3
Sept.....	166.3	138.6	123.1	133.6	129.8	152.1	113.6	133.8
Oct.....	164.7	138.7	123.4	136.8	131.9	150.7	113.6	134.4
Nov.....	158.6	138.5	123.8	142.2	132.8	151.0	114.4	135.1
Dec.....	157.8	135.6	125.0	144.8	132.8	150.5	114.4	134.8

It is not difficult to locate the chief beneficiaries of the high cost of living from this table. The producer and the middle man have divided the 71% advance in the farm products and 48% in lumber and building materials, the farmer being the producer in one case and the lumberman in the other. In no case has the freight rate added anything to these swelling prices.

THE RAILWAYS AND THE COST OF LIVING.

Applying to the wages paid railway employes and the average receipts from rates the same process by which the Bureau of Labor ascertains the relative rise or fall in the cost of living enables us to present in the next summary a graphic contrast between what the railways pay and what they get:

RELATIVE DAILY WAGES OF OTHER TRAINMEN, OTHER SHOPMEN, OTHER TRACKMEN AND ALL OTHER EMPLOYES AND LABORERS, 1892 TO 1913, COMPARED WITH AVERAGE FOR THE EIGHT-YEAR PERIOD, 1892 TO 1899, WITH SIMILAR COMPARISON FOR AVERAGE FREIGHT AND PASSENGER RATES.

Year	Relative Rates of Daily Pay				Relative Receipts per Mile	
	Other Trainmen	Other Shopmen	Other Trackmen	Other Employes and Laborers	Per Ton of Freight	Per Passenger
1892 Official.....	98.9	100.0	103.2	100.4	109.5	104.6
1893.....	100.0	102.3	103.2	102.2	107.1	103.3
1894.....	98.9	98.8	99.9	99.2	104.9	97.7
1895.....	99.5	99.4	99.0	99.2	102.3	100.4
1896.....	99.5	98.8	99.0	99.2	98.3	99.4
1897.....	99.5	100.0	98.1	98.5	97.3	99.6
1898.....	102.1	99.4	98.1	100.4	91.8	97.1
1899.....	101.5	100.6	99.9	101.6	88.3	97.4
1900.....	102.6	101.2	103.2	102.7	88.9	98.3
1901.....	104.7	102.3	104.1	101.6	91.4	99.1
1902.....	106.8	103.5	105.8	102.7	92.3	97.7
1903.....	113.6	108.8	110.8	106.4	93.0	98.7
1904.....	118.3	111.7	112.5	109.4	95.1	98.7
1905.....	120.6	112.3	111.6	110.0	93.4	96.6
1906.....	123.0	112.3	115.1	110.0	91.2	98.3
1907.....	133.0	120.5	123.5	115.4	92.6	99.2
1908.....	136.1	124.0	122.6	118.4	92.0	95.3
1909.....	135.6	124.6	116.7	119.0	93.0	94.0
1910.....	140.8	127.5	124.4	120.8	91.8	95.4
1911.....	150.8	131.0	126.1	125.0	92.4	97.1
1912 Bureau.....	158.1	131.6	126.9	128.9	90.4	98.1
1913 ".....	160.0	133.9	139.0	129.5	88.7	98.8

The period 1892 to 1899 was chosen for the base rate because the Commission's figures of daily compensation only date back to 1892. While the limitation to eight years works no material difference in the relative rates of pay, the inclusion of 1890-91 would have shown a relatively greater decrease in passenger and freight rate averages, because of the sharp decline in both for those years.

The four classes represented were chosen for the comparison because they are the most numerous bodies of railway employes,

their yearly compensation amounting to almost 50% of the total payroll. Moreover, "other trainmen" represent the more highly organized railway employees; the "other shopmen" are affiliated with outside labor unions, and the other two classes represent unorganized labor.

This table presents the railway dilemma in what may be called all its statistical nakedness. No theory of efficiency expert or interested agitator can hide or obscure these facts. If railway rates had remained level with the basic figures, the steady advance in railway wages alone would necessitate an advance in rates eventually. But when the rise in wages is coincident with an absolute decline in average rates the case is desperate and demands immediate and substantial relief. To-day it is not so much the Cost of Living that is troubling the railways, but the right to live at all.

IV CAPITALIZATION

There is no falsehood so obviously false that it will not find ready acceptance from those who want to believe it. For more than a decade now there has been no lie so bandied about by agitators, politicians and quasi-economists with so little truth in it as the charge that American railways were grossly over-capitalized. Over-capitalization, as the public understands it, is when the face value of the securities of any corporation or industry exceeds the value of the property or undertaking upon which they are a charge. In economics capital is "an accumulation of the products of past labor capable of being used in the support of present or future labor." And this is precisely what the capital invested in American railways to-day is. It is an accumulation, tier on tier, of the products of labor in American railways for over eighty years. In fact the accumulation began before Stephenson perfected the Rocket or Peter Cooper tried his prentice hand on a locomotive for the Baltimore and Ohio. And be it remembered that this accumulation consists of more than cold cash. It includes three generations of human conception, courage, forethought, skill, persistence, patience, energy, faith and the indomitable will that removes mountains, spans rivers and conquers space.

This is the accumulation of the products of past labor, foresight and self-denial that has given to this republic 250,000 miles of the best railway line in the world for a net capitalization of approximately \$15,500,000,000. In the preceding pages the physical evidences of this accumulation of past labor as represented in 370,000 miles of track, 63,000 locomotives, 51,000 passenger cars and 2,380,000 freight cars have been reviewed. But that review utterly fails to account for the unnumbered millions invested in the terminals necessary to handle the passengers and freight of a nation now numbering nearly 100,000,000 souls.

We have also seen that it takes an army of over 1,800,000 men working on an average of 304 days a year and paid upwards of \$1,373,000,000 annually to keep this vast accumulation of property keyed up to the demands of American industry.

It is next in order to find out how this accumulation is represented in capital issues of bonds and stocks.

According to the reports to the Interstate Commerce Commission for the year ending June 30, 1912, covering 240,238 miles of line, of

which 10,824 was operated under trackage rights, the par value of railway capital outstanding including that of non-operating subsidiary lines was \$19,533,750,802, of which \$8,469,560,687 was stock and \$11,064,190,886 was funded debt. If to the above total the sum of \$225,008,390 reported for Class III roads in 1911 be added we have a grand total of \$19,758,759,192 to represent the gross capitalization in 1912.

CAPITALIZATION IN 1913.

This Bureau's summary of capitalization for the year 1913, as reported by 433 operating roads covering 242,177 miles of line, of which 10,900 were used under trackage rights, is as follows:

SUMMARY SHOWING CAPITALIZATION OF 433 COMPANIES OPERATING 242,177 MILES OF LINE FOR 1913.

Capital Stock.....	\$7,316,115,837	
Funded Debt.....	10,121,583,089	
Receivers' Certificates.....	35,742,519	
Total 202,336 miles owned.....		\$17,473,441,445
Rental 39,841 miles, \$129,300,750, capitalized @ 5%....		2,586,015,000
Total (242,177 miles).....		\$20,059,456,445
Deductions —		
For Railway Stock Owned.....	\$3,035,092,238	
For Funded Debt Owned.....	1,729,739,061	\$4,764,831,299
Net Capitalization 1913 (242,177 miles).....		\$15,294,625,146
Net Capitalization per Mile Operated.....		63,154

That this approximation is over rather than under the actual net capitalization is indicated by the fact that no deduction is made on account of

Other than railway stocks owned.....	\$654,580,551
Other than railway funded debt owned.....	212,149,104
Total.....	\$866,629,655

In 1911, by a somewhat different process, the Commission, with only 234,717 miles represented, arrived at \$63,944 as the net capitalization per mile of line.

NET CAPITALIZATION OF ALL ROADS IN 1913.

Accepting \$15,294,625,146 as approximately the net capitalization of the 242,177 miles reporting to this Bureau, it is only necessary to put an arbitrary valuation on the 10,000 miles from which no returns

were received to arrive at a close estimate of the net capitalization of all the railways of the United States. In its last complete report, 1911, the Commission gave \$225,008,390 as the gross capitalization of the Class III roads which operated 10,139 miles of line yielding an average of \$22,000 per mile. The Bureau's figures include quite a number of these roads, while it has failed to get reports from a few of the Class II roads. It is, therefore, fair to assume that \$25,000 a mile would be about the correct capitalization for the missing roads. Accepting this as the basis, the following statement shows the net capitalization of all the railways in the United States in 1913.

SUMMARY SHOWING NET CAPITALIZATION OF ALL THE RAILWAYS
IN THE UNITED STATES, JUNE 30, 1913.

Net Capitalization 242,177 miles shown supra.....	\$15,294,625,146
10,000 miles not represented at \$25,000 per mile.....	250,000,000
Total for 252,177 miles of operated lines.....	\$15,544,625,146
Less Assigned to Other Properties in 1911.....	35,775,324
Net Capitalization all Railways, 1913.....	\$15,508,849,822
Net Capitalization per Mile of Line.....	61,064
Net Capitalization per Mile of Track (370,000 miles).....	41,915

There are only two items on the face of the foregoing computations to which any doubting Thomas can raise a question — the deductions on account of securities owned. Any objection to these items is answered by the fact that in 1913 the operating companies received no less than \$279,868,243 income from these investments in other railway stocks and bonds and other securities. This is equivalent to nearly 6% on the railway securities or nearly 5% on all securities owned. It contains more or less duplication, or the demonstration of value would be complete.

GROSS AND NET CAPITAL SINCE 1889.

In the following summary the statement of the Gross and Net Capitalization of the railways of the United States is brought down to date from the earliest reports of the Commission by adding the Bureau's computations for 1912 and 1913. The preliminary figures of the Commission for 1912 were \$19,533,750,802 which may be compared with the Bureau's figures in the table, which covered 8,650 more miles of line:

SUMMARY OF GROSS RAILWAY CAPITAL, AMOUNT OF RAILWAY SECURITIES OWNED AND NET CAPITALIZATION OF THE RAILWAYS OF THE UNITED STATES, 1913 TO 1889.

Year	Gross Railway Capital	Railway Securities Owned	Net Railway Capital	Net Railway Capital per Mile
1913 Bureau*.....	\$20,059,456,445	\$4,764,831,299	\$15,294,625,146	\$63,154
1912 ".....	19,694,987,553	5,037,442,484	14,657,545,069	61,508
1911 Official†.....	19,208,935,081	4,200,127,511	15,008,707,570	63,944
1910‡ ".....	18,417,132,238	4,078,556,298	14,338,575,940	62,657
1909‡ ".....	17,487,868,935	†3,776,001,202	13,711,867,733	59,259
1908‡ ".....	16,767,544,827	3,933,953,317	12,833,591,510	57,201
1907 ".....	16,082,146,683	3,161,794,135	12,920,352,548	58,298
1906 ".....	14,570,421,478	2,898,480,829	11,671,940,649	54,421
1905 ".....	13,805,258,121	2,638,152,129	11,167,105,992	53,328
1904 ".....	13,213,124,679	2,501,330,601	10,711,794,078	52,099
1903 ".....	12,599,990,258	2,318,391,953	10,281,598,305	51,559
1902 ".....	12,134,182,964	2,208,518,793	9,925,664,171	50,961
1901 ".....	11,688,147,091	2,205,497,909	9,482,649,182	49,925
1900 ".....	11,491,034,960	1,943,050,349	9,547,984,611	51,092
1899 ".....	11,033,954,898	1,601,913,167	9,432,041,731	51,215
1898 ".....	10,818,554,031	1,521,386,255	9,297,167,776	51,856
1897 ".....	10,635,008,074	1,466,936,176	9,168,071,898	51,396
1896 ".....	10,566,865,771	1,501,346,914	9,065,518,857	51,141
1895 ".....	10,346,754,229	1,447,181,534	8,899,572,695	51,421
1894 ".....	10,190,658,678	1,544,058,670	8,646,600,008	50,358
1893 ".....	9,894,625,239	1,563,022,233	8,331,603,006	50,293
1892 ".....	9,686,146,813	1,391,457,053	8,294,689,760	52,348
1891 ".....	9,290,915,439	1,282,925,716	8,007,989,723	50,858
1890 ".....	8,984,234,616	1,406,907,001	7,577,327,615	49,473
1889 ".....	8,574,046,742	1,151,972,901	7,422,073,841	50,013

*Covers 242,177 miles. See above for net capital of all railways.

†Does not include returns for switching and terminal companies.

‡If railway securities owned in 1908 is correct, the amount for 1909 is about \$300,000,000 below what it should be.

During the twenty-four years covered by the above table, while the entire railway was undergoing a complete transformation in roadbed, rails, equipment, stations and facilities, the capital cost increased less than \$3,000 per mile of track, as the following figures show:

Net capital per mile of track, 1913.....\$41, 915
 Net capital per mile of track, 1899..... 38, 911

Increase in 24 years..... \$3, 004

DISTRIBUTION OF CAPITAL BY GROUPS.

The next summary shows the distribution of the gross railway capital among the territorial groups according to the Commission's reports for the years 1890, 1900 and 1910 and as reported to the

Bureau for 1913. It is impractical to make such assignment for net capitalization because the ownership of securities is not confined to companies lying in the same territorial group:

SUMMARY OF RAILWAY CAPITAL ON JUNE 30, 1890, 1900, 1910 AND 1913 BY GROUPS.

Territory Covered	1890	1900	1910 240,830 Miles Represented	1913 202,336 Miles Represented
Group I.....	\$ 377,417,302	\$ 472,329,210	\$ 799,627,536	\$ 592,482,573
Group II.....	2,032,242,616	2,337,874,067	3,543,053,383	2,892,875,064
Group III.....	1,309,390,715	1,490,997,662	2,414,370,374	2,225,993,160
Group IV.....	410,704,029	631,863,020	960,183,380	1,207,242,224
Group V.....	742,670,372	903,681,993	1,346,913,136	1,138,785,319
Group VI.....	1,818,588,865	2,024,541,064	3,102,203,094	2,560,938,111
Group VII.....	443,136,450	560,763,313	1,047,244,431	1,690,238,308
Group VIII.....	1,047,274,401	1,395,350,723	2,260,370,943	2,876,023,428
Group IX.....	372,982,285	511,034,132	808,905,131	578,366,270
Group X.....	882,876,385	1,162,599,776	2,134,260,830	1,674,754,379
Total.....	\$9,437,343,420	\$11,491,034,960	\$18,417,132,238	\$17,437,698,926
Less Stocks and Bonds Owned	1,406,907,001	1,943,050,349	†4,078,556,298	4,764,831,299
Net Railway Capital.....	\$8,030,436,319	\$9,547,984,611	\$14,338,575,940	\$12,672,867,627

*Includes \$453,108,804 "other forms of indebtedness" excluded in other years.

†Includes \$36,953,808 assigned to "other properties."

The noticeable discrepancy between the totals for 1910 and 1913 is primarily due to the fact that the figures for 1910 include non-operating as well as operating lessor and lessee roads, whereas those for 1913 are confined strictly to operating companies who paid \$129,-052,922 rent for the 39,841 miles of leased line operated. This rental capitalized should be added to the above totals for 1913 to reach an approximation of the net capitalization of all the roads in the United States for that year.

NEW RAILWAY CAPITAL IN 1913.

According to the reports to this Bureau there was an increase of \$832,831,618 in gross railway capitalization outstanding for the year 1913 over 1912. Of this \$299,412,761 was stock and \$533,418,857 was funded debt. During the same period there was a decrease of \$272,611,185 in stocks and bonds owned.

In its issue of January 17, 1914, the *Commercial and Financial Chronicle* stated that a total of \$1,260,059,330 securities had been listed on the New York Stock Exchange for the first time during the calendar year 1913, divided as follows:

NEW CAPITAL IN 1913.

	Bonds	Total
Steam Railway.....	\$281,291,100	.....
Electric Railway.....	183,631,000	.....
Miscellaneous.....	183,144,000	\$648,066,100
	Stocks	
Steam Railway.....	\$242,809,650	.....
Electric Railway.....	12,139,000	.....
Miscellaneous.....	357,044,580	\$611,993,230
		\$1,260,059,330

It will be observed that \$524,100,750 of the total issue was of railway securities against only \$345,787,000 in 1912. Of the railway bonds no less than \$144,367,800 were for the refunding and retiring of old issues, while \$121,792,650 of the stock was to retire bonds, leaving the net issue of railway securities for the year as follows:

Steam railway bonds.....	\$136,923,300
Steam railway stocks.....	121,017,000
Total.....	\$257,940,300

This was \$15,795,200 above the small net issue of 1912, but hundreds of millions below the crying necessity for new capital.

There was an increase of \$6,906,606 in Receivers' Certificates outstanding during the year 1913.

Financial journals that keep track of the issue of railway notes, which are the temporary expedients adopted while waiting for more favorable conditions, differ widely as to the amounts issued in 1913. A conservative authority places the total at \$296,119,000, which is an increase of nearly \$105,000,000 over the preceding year. These notes bear from 5% to 6% interest and have one, two or three years to run. It is impossible to determine what portion of the proceeds was for use in refunding other obligations.

CAPITALIZATION OF FOREIGN RAILWAYS.

The next summary affords the student the most convincing reply to every charge that generally speaking, or in the aggregate, American railways are over-capitalized. This statement gives the capital cost, or cost of construction, of the railways of the principal foreign countries compiled from the latest official sources.

SUMMARY OF CAPITALIZATION OF PRINCIPAL FOREIGN RAILWAYS.

Year	Country	Miles Line	Capital or Cost of Construction	Per Mile
Europe				
1912	United Kingdom.....	23,441	\$ 6,501,272,332	\$277,346
1911	German Empire.....	37,195	4,244,187,169	114,145
1909	Russian Empire*.....	41,500	3,478,263,650	83,813
1911	France.....	25,194	3,720,480,021	148,625
1911	Austria.....	14,104	1,702,243,423	120,692
1911	Hungary.....	13,012	901,789,366	69,211
1911	Italy (state).....	8,270	1,131,300,000	126,886
1909	Spain (state).....	9,056	729,929,464	89,461
1908	Portugal.....	1,465	162,385,280	110,830
1909	Sweden.....	8,434	278,769,309	32,964
1912	Norway.....	1,913	82,791,431	43,282
1912	Denmark (state).....	1,207	72,533,990	60,094
1911	Belgium (state).....	2,684	512,414,202	190,914
1910	Netherlands.....	1,980	163,798,304	82,810
1911	Switzerland.....	2,944	351,628,701	120,950
1912	Roumania.....	2,164	195,003,678	90,113
1911	Servia¶.....	551	34,882,135	63,307
1911	Bulgaria (state).....	1,197	56,559,713	47,200
Total Europe, including Asiatic Russia		196,311	\$24,320,232,168	\$123,886
Other Countries				
1913	Canada†.....	38,223	\$1,873,452,237	\$63,932
1912	British India.....	33,484	1,510,187,000	45,101
1910	Argentine Republic ‡.....	17,381	868,914,950	49,981
1911-12	Japan (state).....	4,950	436,114,999	88,104
1913	New South Wales§.....	3,930	280,572,110	71,391
1913	New Zealand§.....	2,840	153,946,641	53,828
1912	Queensland§.....	4,226	135,148,475	31,980
1913	Victoria§.....	3,639	231,657,796	63,519
1913	West Australia.....	2,854	72,574,737	25,429
1913	South Australia.....	1,534	68,999,597	44,970
1913	United States.....	252,177	15,508,849,822	61,064

*Includes Asiatic Russia Railways.

¶Includes 195 miles narrow gauge.

†Including government subsidy.

‡About two-thirds 5 ft. 6 in. gauge, remainder 3 ft. 3½ or 2 ft. 6 in. gauge.

§New South Wales Railways are 4 ft. 8½ in. gauge; New Zealand and Queensland 3 ft. 6 in., and Victoria (all but 122 miles) 5 ft. 3 in.

An increase of \$2,433 per mile is to be noted in the capitalization of European railways, and the comment of every intelligent traveler is that they need much more to bring them anywhere near the standard of American efficiency. In stations alone are European railways to be compared with ours. As we have over 50,000 stations, that is to say, one per every five miles, and a majority of them calling for improved depots ranging in cost from \$1,000 to \$50,000,000, it is easy to see where several billions could be added to the unremunerative investment in American railways.

Japan continues to afford the most illuminating illustration of the growth of railway capitalization under state ownership. Under private ownership its railways were capitalized at \$42,800 per mile. When taken over by the state their capitalization was increased to \$78,820 in 1909. In 1911 it had risen to \$86,343, and in 1912 to \$88,104, and the Japanese railways are only 3 ft. 6 in. gauge at that.

Germany also is setting a good pace in piling up a formidable capital account. In 1891 the capital cost of German railways was stated officially to be \$96,000 per mile; in 1911 the same authority places their capital cost at \$114,145 per mile, or an increase of \$18,145 per mile in twenty years.

RAILWAY INCOME ACCOUNT, 1889-1913
pages 394 and 395.

Continued on page 396
COST OF CONSTRUCTION.

RAILWAY INCOME
SHOWING MILEAGE, NET CAPITAL, REVENUES, EXPENSES, TAXES
FROM OPERATION, WITH RATIOS BASED ON REPORTS TO

Year	Miles of Line	Miles of Track	Net Capital (thousands)	Freight Revenue (thousands)	Passenger Revenue (thousands)	Total Revenue inc. Mail, Express etc. (thousands)	Operating Expenses (thousands)
1889	157,759	200,950	\$ 7,422,074	\$ 642,433	\$254,040	\$ 964,816	\$ 644,706
1890	163,597	208,612	7,577,328	714,464	260,786	1,051,877	692,093
1891	168,402	215,999	8,007,990	736,794	281,179	1,096,761	731,887
1892	171,563	222,351	8,294,690	799,316	286,806	1,117,407	780,997
1893	176,461	230,137	8,331,603	829,054	301,492	1,220,751	827,921
1894	178,708	233,533	8,646,600	699,491	285,350	1,073,361	731,414
1895	180,657	236,894	8,899,573	729,993	252,246	1,075,371	725,720
1896	182,428	240,129	9,065,519	786,616	266,563	1,150,169	772,989
1897	183,284	242,013	9,168,072	772,849	251,136	1,122,089	752,524
1898	184,648	245,333	9,297,168	876,728	266,970	1,247,325	817,973
1899	187,543	250,142	9,432,042	913,737	291,113	1,313,610	856,968
1900	192,556	258,784	9,547,985	1,049,256	323,716	1,487,044	961,428
1901	195,561	265,352	9,482,649	1,118,543	351,356	1,588,526	1,030,397
1902	200,154	274,195	9,925,664	1,207,229	392,963	1,726,380	1,116,248
1903	205,313	283,821	10,281,598	1,338,020	421,705	1,900,846	1,257,538
1904	212,243	297,073	10,711,794	1,379,003	444,327	1,975,174	1,338,896
1905	216,973	306,796	11,167,106	1,450,773	472,695	2,082,482	1,390,602
1906	222,340	317,083	11,671,941	1,640,387	510,033	2,325,765	1,536,877
1907	227,455	327,975	12,920,353	1,823,652	564,606	2,589,105	1,749,515
1908	*230,494	333,646	12,833,592	1,655,419	566,833	2,393,805	1,669,547
1909	*235,402	342,351	13,711,868	1,677,615	563,609	2,418,677	1,599,443
1910	*240,831	351,767	14,338,576	1,925,553	628,992	2,750,667	1,822,630
1911	*246,238	362,710	15,008,707	1,925,951	657,638	2,789,761	1,915,054
1912	*†240,238	360,714	15,333,522	1,956,802	657,422	2,826,917	1,958,963
1913	‡242,177	367,657	15,294,625	2,184,533	691,802	3,118,929	2,164,851

* Figures since 1908 exclude switching and terminal companies.

† Traffic expenses excluded since 1908, amounting to about 2% of gross earnings.

‡ Includes only Class I and II roads.

§ Bureau figures 98% of traffic represented.

ACCOUNT 1889-1913

MAINTENANCE AND TRANSPORTATION CHARGES AND NET REVENUES
THE INTERSTATE COMMERCE COMMISSION, 1889 TO 1913.

Taxes (thou- sands)	Ratio Exp. and Taxes to Earn- ings	Net Operat- ing In- come (thou- sands)	Per- cent- age on Cap- ital	Mainte- nance of Way and struc- tures (thou- sands)	Ratio to Earn- ings	Mainte- nance of Equip- ment (thou- sands)	Ratio to Earn- ings	Trans- portation Expenses (thou- sands)	Ratio to Earn- ings	Year
27,590	69.66	\$292,520	3.94	\$144,822	15.01	\$106,709	11.06	\$330,915	34.29	1889
31,207	68.74	328,577	4.33	152,719	14.52	114,039	10.14	354,189	33.67	1890
33,280	69.51	333,159	4.16	153,672	14.01	117,048	10.67	384,385	35.05	1891
34,053	69.56	356,457	4.30	164,189	14.01	128,712	10.99	406,729	34.72	1892
36,514	70.79	356,316	4.27	169,258	13.86	136,876	11.21	435,466	35.67	1893
38,125	71.68	303,822	3.51	143,669	13.39	112,894	10.52	394,513	36.75	1894
39,832	71.18	309,819	3.48	143,976	11.92	113,788	9.42	431,149	35.69	1895
39,970	70.68	337,310	3.72	160,345	13.94	133,982	11.65	442,218	38.45	1896
43,137	70.90	326,428	3.56	159,434	14.20	122,762	10.94	432,526	38.55	1897
43,828	69.09	386,215	4.15	173,315	13.89	142,625	11.43	464,674	37.25	1898
46,337	68.77	410,305	4.35	180,411	13.73	150,919	11.49	486,160	37.01	1899
48,332	67.89	477,284	5.00	211,221	14.20	181,174	12.18	529,116	35.58	1900
50,944	68.06	507,185	5.35	231,057	14.54	190,300	11.98	565,266	35.58	1901
54,465	67.81	555,667	5.59	258,382	14.39	213,381	12.36	609,962	35.33	1902
57,849	69.20	585,459	5.70	266,422	14.01	240,430	12.65	702,510	36.95	1903
61,696	70.91	574,582	5.37	261,280	13.23	267,185	13.53	758,239	38.39	1904
63,474	69.82	628,406	5.63	275,046	13.21	288,441	13.85	771,229	37.03	1905
74,785	69.29	714,103	6.12	311,721	13.40	328,555	14.13	836,203	35.95	1906
80,312	70.63	760,278	5.88	343,545	13.23	368,062	14.22	970,953	37.49	1907
84,555	73.20	639,703	4.98	329,373	13.76	368,354	15.39	†868,252	†36.27	1908
90,529	69.86	728,705	5.31	308,450	12.75	363,913	15.05	814,088	33.66	1909
103,795	70.06	824,242	5.74	368,509	13.39	413,110	15.02	916,615	33.32	1910
108,309	72.54	766,398	5.31	366,025	13.12	428,367	15.35	987,382	35.29	1911
119,900	73.54	748,054	4.88	363,495	12.86	448,303	15.86	1,013,340	35.85	1912
129,052	73.55	825,026	5.39	418,023	13.40	511,143	16.39	1,096,553	35.15	1913

V COST OF CONSTRUCTION

Ten years from now, as an incident of Federal valuation of the railways of the United States, we may have an approximate idea of what they have cost. To-day there is no accepted data from which anything more than an intelligent guess can be formulated. In the general balance sheet statement as prepared by the Commission for the year 1911, however, the following figures appear, which throw some light on the subject:

<i>Class I Roads</i> (169,201 miles)	
Investment in road and equipment to June 30, 1907	\$ 9,360,379,731
Investment in road and equipment since June 30, 1907.....	2,518,453,293
Advances for construction	439,479,921
Working assets less working liabilities.....	1,090,615,839
Total	\$13,398,928,784
<i>Class II Roads</i> (17,429 miles)	
Investment in road and equipment	723,171,797
<i>Non-operating Roads</i> (37,211 miles)	
Investment in road and equipment	2,583,938,399
Total (223,841 miles)	\$16,706,038,980

Switching and terminal companies are excluded in this statement, but in another part of the report the investment in road and equipment is given for the individual terminal companies aggregating \$202,768,028 for 1,529 miles of line owned. Added to the above, this yields a total investment of \$16,908,807,008 for 225,370 miles. Even this takes no account of at least 17,000 miles of line. In other words, it ignores more mileage than the entire railway system of Austria, with that of Switzerland added.

From the returns to this Bureau, identical with those made to the Commission for the year 1913, but not going into as full details, the following statement of the investment in 242,177 miles of operated line has been compiled.

COST OF ROAD AND EQUIPMENT FOR THE YEAR ENDING JUNE 30,
1913 (242,177 MILES OF LINE REPRESENTED).

Investment in road (202,336 miles owned)	\$10,380,344,658
Investment in equipment	2,582,331,113
Investment undistributed	757,463,139
Total investment reported	\$13,720,138,910
Rental of 39,841 miles @ 5%	2,586,015,000
Net working assets (<i>vide</i> preceding table)	1,090,615,839
Total investment 1913 (242,177 miles)	\$17,396,769,749
Official balance sheet 1911 (223,841 miles)	16,706,038,980
Increase	\$690,730,769

That these figures, large as they are, do not exaggerate the actual investment in American railways, is not open to intelligent question. In the item for equipment alone there is an understatement of at least a billion dollars. As the reader has seen, the present equipment, which has been practically renewed within the last twenty years, cannot have cost less than \$3,732,000,000.

It should not escape the reader's attention that the cost of leased property, consisting of 39,841 miles of line, computed on the rental actually paid in 1913, very closely approximates the investment (\$2,583,938,399) reported for the non-operating roads in 1911. This is a welcome corroboration of the result arrived at by the Bureau's method of fixing the value of this important division of railway property.

This computation of the cost of American railways does not take into account the appreciation of railway property, except as it may have figured in reorganizations which have followed the numerous receiverships that have overtaken so many companies in the past three quarters of a century. If this appreciation could be appraised, it would probably add two billions more to the investments already accounted for and put the present cost of reproducing all the railways of the United States well above \$21,000,000,000.

PHYSICAL VALUATION OF AMERICAN RAILWAYS.

Although a year has elapsed since Congress yielded to the agitation for a physical valuation of the railways, little has been done beyond providing the organization and selecting the men to have charge of the work in the several sections of the country. Ex-Chairman Prouty has ended his long service on the Commission to direct the valuation

and will bring to his new task the benefit of a thorough knowledge of the railways of the United States.

Pending the national valuation, many of the states have undertaken valuations on their own account. The results of several of these, so far as published, are shown in the following table:

SUMMARY OF STATE VALUATIONS.

Steam Railroads of	Cost of Reproduction	Present Value	Capitalization
Washington.....	\$194,057,240	\$175,797,025	\$161,582,000
South Dakota.....	106,494,503	91,605,132	109,444,600
Minnesota.....	360,961,548	309,706,514	300,027,676
Wisconsin.....	296,803,322	240,718,711	225,000,000
Nebraska.....	308,863,673	260,169,253	*263,170,000
Total.....	\$1,267,180,286	\$1,077,996,635	\$1,059,224,276

*Commercial valuation in 1904 Census Bulletin 21.

In the case of Nebraska, where the reappraisal was made as of July 1, 1911, the figures given are those without the cost of acquirement, and the present value is found by applying depreciation to the cost of production. Mr. E. C. Hurd, the engineer in charge of the appraisal, gives alternative figures including the cost of acquiring the right-of-way and station grounds in which he puts the cost of construction at \$327,190,820.

An exhaustive valuation is proceeding in Kansas, and last September the engineer in charge for the Public Utilities Commission reported an estimated cost to reproduce the Union Pacific new of \$37,-156 per mile and a present physical value of \$27,458. In determining the probable damages to be paid by the railway or "multiple cost" it was found that this was larger for farm property than for town property. In individual cases it ranged from donations to ten times the market value. The range in extended sections was from 2¼ to 2½ times. No allowance was made for "adaptation and solidification" and none for any intangible value. Applying the figures for reproduction new to the 9,320 miles of line in Kansas would give a total valuation for the state of \$346,293,920, which is \$10,000,000 below the commercial valuation made by Prof. Adams nine years ago.

In 1911 the railways paid \$2,835,513 ad valorem taxes in Kansas and as the average tax rate for that state is .71 per \$100 the value of their real and personal property for taxing purposes was very close to \$400,000,000.

Some figures given out by the California Railroad Commission of

the results of appraising several minor roads in that state afford a line on the vagaries of valuation. For six of the roads the figures are as follows:

VALUATION OF SIX SMALL CALIFORNIA ROADS.

Road	Original Cost	Reproduction Cost	Present Value
Lake Tahoe Ry.....	\$630,793	\$461,898	\$323,216
Pajaro Valley R. R.	560,236	747,295	540,782
Porterville Northeastern	503,310	479,198	470,290
Sacramento Valley & E. R. R.....	549,007	392,382	349,669
Santa Maria Valley R. R.	234,966	282,150	216,509
Tonopah & Tidewater R. R.	2,599,661	2,474,235	2,008,289
Total.....	\$5,077,973	\$4,837,158	\$3,908,755

This statement affords an interesting study of the methods employed to depreciate the value of railway property. Writing off over 20% for depreciation of property which is presumably maintained and renewed in serviceable order is a wholly arbitrary proceeding. It is also significant that the reproduction cost is not equal to the original cost, although since the building of the several roads there has been a marked advance in everything pertaining to their construction.

VI

OWNERSHIP OF AMERICAN RAILWAYS

At the date of the last election of directors prior to June 30, 1913, the records of the 433 companies reporting to this Bureau showed **406,315** shareholders, an increase of 28,013 over the number reported for practically the same roads in 1912. This is slightly over two shareholders per mile of line. Assuming that the same proportion maintains for the mileage not reported would yield a total of over half a million shareholders in the 252,000 miles of railway in the United States.

The following statement shows how the number of shareholders in nineteen of the principal roads has increased since the Interstate Commerce Commission reported there were only 327,785 shareholders in 1,182 roads in 1904.

GROWTH IN NUMBER OF STOCKHOLDERS IN PRINCIPAL AMERICAN
RAILWAYS, 1904 TO 1913.

Name of Company	Shareholders			
	1904	1911	1912	1913
Pennsylvania R. R.....	44,175	69,352	74,002	84,244
Atchison, Topeka & Santa Fe.....	17,823	29,246	31,738	36,341
New York Central & Hudson River....	11,781	21,202	22,247	20,945
New York, New Haven & Hartford....	10,842	20,262	21,948	22,642
Union Pacific.....	14,256	19,420	21,600	23,120
Great Northern.....	383	16,973	17,841	18,327
Southern Pacific.....	2,424	12,813	14,387	15,757
Northern Pacific.....	368	12,715	13,987	15,612
Chicago, Milwaukee & St. Paul.....	5,832	10,962	11,819	13,490
Baltimore & Ohio.....	7,132	10,743	11,414	12,319
Illinois Central.....	9,123	9,831	9,987	10,545
Erie.....	4,309	9,047	7,847	7,527
Chicago & North Western.....	4,109	8,167	8,564	8,920
Boston & Maine.....	7,402	7,295	8,105	8,107
Norfolk & Western.....	2,911	4,484	5,323	6,976
Denver & Rio Grande.....	2,910	4,925	4,928	4,737
Missouri Pacific.....	1,861	3,711	4,382	4,636
Chesapeake & Ohio.....	1,478	3,403	4,138	4,525
Louisville & Nashville.....	1,672	3,080	3,318	3,574
Total.....	149,791	277,631	297,575	322,344
Increase since 1904, per cent.....				115.5%

From this it appears that the number of shareholders in these nineteen roads has more than doubled in nine years. Moreover they now number almost as many as the total reported for all the companies

in 1904. This signifies a distribution of railway ownership little dreamed of in the nightmares of railway baiters. Of the 89,313 shareholders reported for the Pennsylvania R. R. March 1, 1914, no less than 48% were women.

The average holding per shareholder in the United States is about \$18,000, from which the average dividend was approximately \$600, or about the yearly pay of a railway laborer. Of course, the great majority of shareholders did not hold 180 shares each, or anything like it, and it is safe to say that there are 350,000 holders of railway shares whose income therefrom does not equal the average pay of all railway employes. It is doubtful if there are not 400,000. But all these shareholders are as vitally interested in just, reasonable and efficient regulation of railways as in their honest, efficient and progressive management.

Back of the ownership of railway stock, reposing faith in the safety of railway property and the honesty and stability of republican institutions, is an army of investors in railway bonds. It is estimated that these outnumber the shareholders two to one. In that case railway bonds are in the hands of nearly a million persons, scattered all over the globe.

If the holdings by banks, savings banks, insurance companies, educational and benevolent institutions and trustees of all manner of funds in railway securities be taken into account, the indirect distribution of interest in the welfare of American railways mounts into the millions. In savings banks alone in 1912, holding \$794,083,005 in railway bonds and stocks, there were over 10,000,000 depositors.

The *Commerical and Financial Chronicle* last November estimated that the several institutions mentioned above held railway securities ranging "somewhere between \$1,750,000,000 and \$2,000,000,000." The estimate is well within the mark.

VII

PUBLIC SERVICE OF THE RAILWAYS

34,447,197,000 passengers carried one mile at.....2.008 cents per mile
 300,558,334,000 tons of freight carried per mile at.....7.268 mills per mile

Those two lines tell the story of achievement for which all the vast expenditures for road, equipment, facilities and labor were the necessary prelude. It is an achievement without a parallel in the history of transportation from the ox-drawn sledge down to the 300-ton mallet engine.

In the matter of freight ton mileage alone the railways of the United States have not only carried more than the railways of any other land, but more than the railways of all other countries combined. The American who does not take a just pride in this achievement must be an American whose mental vision is bounded by the numerals of one hand, for upon it rests the material greatness and amazing progress of this republic.

In these two lines is condensed all that is necessary to refute every generalization about the over-capitalization, extravagant management, exorbitant rates and inefficient operation of American railways. Men do not gather grapes of thistles. Such a result as 300 billion tons of freight carried one mile for $7\frac{1}{4}$ mills per ton mile, comes not by watered stock, spendthrift management, extortion and inefficiency, but through the adaptation of means to the immediate end, as has been the general history of American railways from Peter Cooper down to James J. Hill. Of mismanagement, scandals and malpractices there have been more than enough. But from them all American railways have emerged the most effective and cheapest transportation agency in the world.

The first statement under this title naturally covers the salient features in handling passengers and freight during the years ending June 30, 1909, 1910, 1911, 1912 and 1913:

COMPARATIVE SUMMARY OF PASSENGER AND FREIGHT SERVICE FOR
THE YEARS ENDING JUNE 30, 1913, 1912, 1911, 1910 AND 1907.

Item (m = 000 omitted)	1913 Bureau Figures	1912 Bureau Figures	1911† Official Figures	1910† Official Figures	1907 Official Figures
Miles Represented.....	242,177	236,444	246,238	240,830	227,454
PASSENGER SERVICE					
Passengers carried (m).....	1,018,283	972,008	997,409	971,683	873,905
Passengers carried 1 mile (m)...	34,447,197	32,820,623	33,201,694	32,338,496	27,718,554
Passengers carried 1 mile per mile of line.....	142,235	138,810	139,191	138,169	123,259
Mileage of revenue passenger trains (m).....	596,826	572,294	572,929	549,015	509,328
Average number of passengers in train.....	57.7	57.3	55	56	51
Average journey per passenger, miles.....	33.83	33.76	33.48	33.50	31.72
Passenger car miles (m).....	3,331,616	3,194,452	3,136,774*	2,998,170	.....
Average passengers per car...	10.34	10.27	10.58	10.83	.....
FREIGHT SERVICE					
Number of tons reported car- ried (m).....	2,009,462	1,765,512	1,781,638	1,849,900	1,796,336
Tons carried 1 mile (m).....	300,558,334	261,416,643	253,783,701	255,016,910	236,601,390
Tons carried 1 mile per mile of line.....	1,241,073	1,101,390	1,053,566	1,071,086	1,052,119
Mileage of revenue freight trains (m).....	640,659	605,236	626,496	635,450	629,996
Average number of tons in trains.....	469	432	383	380	357
Typical haul of average rail- way, miles.....	149	148	143	138	132
Mileage of revenue mixed trains (m).....	37,052	34,961	36,461	35,807	32,111
Total revenue train mileage (m).....	1,274,538	1,212,491	1,237,500	1,221,852	1,171,923
Total mileage of freight cars (m).....	21,002,386	19,319,307	19,315,156	18,981,573	17,122,260
Average freight car miles per day.....	25.4	23.4	24.0	24.3	22.7
Average tons per car.....	14.31	13.53	13.14	13.43	13.82
Total locomotive miles (m)...	1,734,411	.....	1,655,927	1,645,251	.....

†Exclude returns from switching and terminal companies, included in 1913, 1912 and 1907.

*Includes 123,210 unclassified.

If there has been any failure of American railways to render adequate service to the American people, it is not discernible in the tell-tale results of this table. In covering such a vast field, there must in the course of finite affairs be many errors and occasions for complaint. But in the final summary, by which the transportation industry has to be judged, such an exhibit as this challenges admiration and should silence detraction.

For the first time on record **the ton mileage passes the 300 billion mark.** This has been accomplished by a 6% increase in train mileage accompanied by an increase of almost 9% in tons per train, which in turn was made possible by an increase of nearly 6% in the average car load.

The effect of trolley competition continues to show in the passenger service in the greater length of the average journey. In ten years this has increased 3.83 miles, and since 1892, when the trolley first became a factor, it has increased almost ten miles, or over 40%. This means that trolley lines have made serious inroads into the short-haul suburban service of the steam roads.

PASSENGER TRAFFIC 1913-1888.

The succeeding summary presents a comprehensive survey of the passenger traffic service and revenue of the railways of the United States by groups and since the Commission began compiling the data down to 1913:

SUMMARY OF PASSENGERS CARRIED, PASSENGER MILEAGE, MILEAGE OF PASSENGER TRAINS, AVERAGE PASSENGERS IN TRAINS, PASSENGER REVENUES AND AVERAGE RECEIPTS PER PASSENGER MILE, 1913 TO 1888:

Territory	Passengers Carried (Millions)	Passengers Carried One Mile (Millions)	Mileage Passenger Trains (Millions)	Average Passengers in Train	Average Journey Miles	Passenger Revenue (Millions)	Average Receipts per Passenger Mile (Cents)
Group I.....	147	2,860	36	79	19.4	\$51	1.794
Group II.....	350	8,258	119	70	23.5	143	1.742
Group III....	112	4,519	82	55	40.4	86	1.899
Group IV.....	39	1,527	40	38	39.9	34	2.174
Group V.....	57	2,233	47	47	39.3	51	2.246
Group VI.....	144	5,764	104	55	40.0	113	1.958
Group VII....	27	1,610	31	52	59.6	36	2.269
Group VIII...	56	3,575	67	53	63.6	80	2.238
Group IX.....	24	1,213	23	52	51.2	29	2.408
Group X.....	62	2,888	47	61	46.8	68	2.355
U. S. 1913....	1,018	34,447	596	57.7	33.8	\$691	2.008
1912 Bureau..	972	32,820	572	57.3	33.7	653	1.991
1911 Official*.	997	33,201	572	55	33.4	657	1.974
1910* "	971	32,338	549	56	34	628	1.938
1909* "	891	29,109	506	54	33	563	1.928
1908* "	890	29,082	505	54	33	566	1.937
1907 "	873	27,718	509	51	32	564	2.014
1906 "	797	25,167	479	49	31	510	2.003
1905 "	738	23,800	459	48	32	472	1.962
1904 "	715	21,923	440	46	31	444	2.006
1903 "	694	20,915	425	46	30	421	2.006
1902 "	649	19,689	405	45	30	392	1.986
1901 "	607	17,353	385	42	29	351	2.013
1900 "	576	16,038	363	41	28	323	2.003
1899 "	523	14,591	347	41	28	291	1.978
1898 "	501	13,379	334	39	27	267	1.973
1897 "	489	12,256	335	37	25	251	2.022
1896 "	511	13,049	332	39	26	266	2.019
1895 "	507	12,188	317	38	24	252	2.040
1894 "	540	14,289	326	44	26	285	1.986
1893 "	593	14,229	335	42	24	301	2.108
1892 "	560	13,362	317	42	24	286	2.126
1891 "	531	12,844	308	42	24	281	2.142
1890 "	492	11,847	285	41	24	260	2.167
1889 "	472	11,553	277	42	25	254	2.199
1888 "	412	10,101	252	40	24	237	2.349
Increase 1888 to 1913	147%	241%	137%	44%	41%	192%	.....
Decrease							14.5%

*Exclu ive of switching and terminal companies.

The student should not miss the lesson in railway economics conveyed in the percentages which show that passenger revenues have

not increased in proportion to passenger service measured by the passengers carried one mile. From the railway point of view the most encouraging feature of this summary is the steady increase in the average number of passengers per train. It is a tradition of the service that at least 50 passengers per train mile is the minimum to meet expenses of operation.

According to a formula adopted by Professor Adams in 1888 to ascertain the cost of passenger service, during the six years of its trial, this was found to be as follows:

	1888	1889	1890	1891	1892	1893
Average cost of carrying a passenger one mile (cents).....	2.042	1.993	1.917	1.910	1.939	1.955

Although the attempt to ascertain the cost of passenger service proved unsatisfactory, and was abandoned in 1894, nothing better has been found to take its place. Accepting these figures as being an approximate official estimate, it will be perceived how slight is the margin of receipts to-day over operating expense twenty years ago, before the price of everything entering into the cost of the service — labor, equipment, and terminal facilities — had risen.

RECEIPTS FROM MAIL AND EXPRESS.

While the Parcel Post law, effective Jan. 1, 1913, expanded the revenues of the Post Office department by from \$15,000,000 to \$20,000,000, and the Postmaster General has been raising the limit with irresponsible and reckless enthusiasm, because he pays no freight, the railways carried the enormous post package business of the fiscal year for nothing — or, to be exact, for less than nothing.

In 1912 the 368 railways operating 236,444 miles of road reporting to this Bureau received \$50,458,769 for carrying the mail; in 1913, including six months under the Parcel Post law, 433, railways operating 242,177 miles, reported their mail receipts as only \$50,053,481. Though like Mercutio's wound, the cut is "not so deep as a well, nor so wide as a church door," yet 'tis enough to complete the ravishment of the railway revenues already depleted under the heavy hand of oppressive regulation.

The proof of the ravishment does not admit of dispute. It is despoliation by force. Simply because the transportation of mails is in a certain sense obligatory, under such regulations as the government may impose, is no reason why the department should violate every principle of justice in denying fair or any pay for the service.

"The question," says a usually well informed newspaper, "whether

the government is losing money on the parcel post and competing unfairly with express companies has been raised repeatedly." That is not the question at all. So long as the government can sell parcel post stamps and force the railways to carry the packages it is in no danger of losing money. The question is one of national honesty and justice, which no popular success of the parcel post can evade or justify.

For several years prior to the appointment of what is known as the joint (Wolcott-Loud) postal service commission in 1898 there had been many charges of excessive prices paid the railways for transporting the mails. The average percentage of railway mail receipts to gross earnings for the five-year period, 1894-1898 inclusive, was 2.85%. After an exhaustive inquiry lasting over two years the commission, in January, 1901, reported that the prices paid the railways were not excessive. From that time to this day the service exacted of the railways has increased in cost and efficiency. The government is arbitrary and peremptory in its specifications as to postal equipment, speed, and terminal accommodations. In 1913 there were 5,473 full and apartment postal cars in use and in reserve, and the department reports:

"Of the 1,353 full railway post-office cars in use and in reserve on June 30, 1913, 596 are all-steel cars, 201 steel underframe cars and 556 wooden cars, an increase of 51 all steel cars and 19 underframe cars and a decrease of 105 in the number of wooden cars.

"Of the 4,120 apartment cars in use and in reserve, 354 are all-steel cars, 322 steel underframe cars, and 3,444 wooden cars, an increase of 173 all-steel cars, 101 steel underframe cars, and a decrease of 183 wooden cars."

It is estimated that it cost an average of 20% more to haul the heavy steel cars than the lighter wooden equipment.

With these facts in mind the conditions set forth in the following statement of mail and express receipts during the past decade will repay study:

SUMMARY OF RAILWAY RECEIPTS FROM MAIL AND EXPRESS, YEARS
ENDING JUNE 30, 1903 TO 1913.

Year	Mail		Express	
	Revenues	Percentage of Earnings	Revenues	Percentage of Earnings
1903 Official.....	\$41,709,396	2.19	\$38,331,964	1.98
1904 ".....	44,499,732	2.25	41,875,636	2.12
1905 ".....	45,426,125	2.18	45,149,155	2.17
1906 ".....	47,371,453	2.04	51,010,930	2.19
1907 ".....	50,378,964	1.94	57,332,931	2.21
1908 ".....	48,517,563	2.03	58,602,091	2.45
1909* ".....	49,380,783	2.04	59,647,022	2.47
1910* ".....	48,913,888	1.78	67,190,922	2.44
1911* ".....	50,702,625	1.82	70,725,137	2.54
1912 Bureau figures.....	50,458,769	1.80	73,053,799	2.60
1913 ".....	50,053,481	1.60	78,536,196	2.52
Increase per cent.....	20.0%	.....	104.9%	.....

*Excludes switching and terminal companies.

The shrinkage in the percentage of railway mail pay compared with railway revenues from express and other sources not only indicts but convicts the government of unfair treatment of the railways. In 1901, when a congressional commission found the price for transporting the mails not excessive, it based its report on years when the percentage averaged over 2.85%; and it is common knowledge that the postal business has kept pace with the general increase in business throughout the United States. The revenues of the Post Office department itself, as set forth in the next summary, bear convincing testimony to this fact:

SUMMARY COMPARING RAILWAY MAIL PAY WITH NUMBER OF
RAILWAY MAIL CLERKS AND POSTAL REVENUES, 1903 TO 1913.

Year	Railway Mail Revenues	Number of Railway Mail Clerks	Postal Revenues
1903.....	\$41,709,396	10,418	\$134,224,443
1904.....	44,499,732	11,621	143,482,624
1905.....	45,426,125	12,474	152,826,585
1906.....	47,371,453	13,598	167,932,783
1907.....	50,378,964	14,357	183,585,006
1908.....	48,517,563	15,295	191,478,663
1909.....	49,380,783	15,866	203,562,383
1910.....	48,913,888	16,578	224,128,657
1911.....	50,702,625	16,792	237,879,823
1912.....	50,458,769	16,636	246,744,015
1913.....	50,053,481	18,265	266,619,525
Ten years' increase per cent.....	20%	75.4%	97.9%

It is well for the railway mail clerks that the government treats them more fairly than it does the railways. Where their number has increased only 75.4%, their pay has increased 103.2%.

If railway mail pay had increased in proportion to the Post Office revenues during the last decade, in 1913 it would have been over \$80,000,000 instead of \$50,053,481.

Between 1903 and 1913, according to the Post Office report, there was an increase of 41% in the mileage of railway mail transportation, which in itself is conclusive that the increase in mail pay was scarcely half what it should have been.

Last November Robert H. Turner, Secretary of the joint Congressional Committee on Postage on Second Class Matter, at the request of its chairman, Senator Bourne, submitted an exhaustive report in which he said: "If the present system of pay is to be continued the conclusion cannot but be reached that the railways are approximately underpaid \$12,000,000, and this without reference to the plan embodied in Document 105."

But in all his calculations Mr. Turner accepts "1.78 per cent (the percentage of mail revenue to total operating revenue for the year 1910)" as the proportion of railway capitalization devoted to the mail service upon which they are entitled to a return of 6 per cent or some other rate. But this is computing with a factor already thoroughly discredited and which was arrived at after the underpayment for an improved and more costly service had been going for at least 15 years.

Adopting the same factor for 1900, the year before the Wolcott-Loud Commission found the railway mail pay not excessive, when it was 2.54%, and applying it to the approximate net capitalization of the railways in 1913, viz., \$15,500,000,000 (the Commission fixed it at \$15,008,707,570 in 1911) on a 6% rate the railways would receive \$8,500,000 more than Mr. Turner included in his estimates. In other words, they were at least \$20,500,000 underpaid according to the corrected computations of impartial official investigators.

Moreover, these figures apply to the year 1912-13 when the parcel post had only been in operation six months and before the limit as to weight had been raised, the postage reduced, and the whole scope of the service extended.

Under existing regulations the railways stand to lose an additional \$20,000,000 for carrying Uncle Sam's mail in 1914.

RAILWAY RECEIPTS FROM EXPRESS.

There was little in the railway receipts from express traffic in 1913 to mark the impending transfer of a material part of business from the express to the mail shoulders of the railways. As seen above the receipts from mail showed no augmentation from the thousands of packages sent by post which formerly went by express or were not sent at all, and the express receipts gave little or no signs of any inroads made by the government bid for the small package traffic. The reduced rates prescribed by the Interstate Commerce Commission did not go into effect until February, 1914, and their effect upon railway revenues will not be apparent much before the close of the current fiscal year. They are charged already with forcing one express company out of business.

In the following summary of revenues and expenses of the principal express companies as reported to the Commission, the payments to the railways are included under the term "Express privileges."

STATEMENT OF REVENUES AND EXPENSES OF THE PRINCIPAL EXPRESS COMPANIES FOR THE YEAR ENDING JUNE 30, 1912 AND 1913, FROM THE MONTHLY REPORTS.

No.	Item.	Grand total (12 companies).	
		1913	1912
1	Steam road mileage.....	254,798	248,628
2	Express revenue.....	\$164,721,850.16	\$156,259,632.06
3	Miscellaneous transportation revenue.....	140,773.38	133,956.17
4	Non-transportation revenue.....	3,927,917.19	3,414,139.81
5	Gross receipts from operation.....	168,790,540.73	159,807,728.04
6	Express privileges—Dr.....	83,872,497.17	78,522,746.85
7	Total operating revenues.....	84,918,043.56	81,284,981.19
8	Maintenance.....	3,762,196.76	3,333,883.10
9	Traffic expenses.....	1,431,488.30	1,225,091.00
10	Transportation expenses.....	68,050,760.43	63,247,803.21
11	General expenses.....	5,973,927.52	5,381,340.87
12	Total operating expenses.....	79,218,373.01	73,188,118.18
13	Net operating revenue.....	5,699,670.55	8,096,863.01
14	Taxes accrued.....	1,379,258.40	1,427,885.30
15	Operating income.....	4,320,412.15	6,668,977.71

Owing to changes in classification this statement is not strictly comparable with those formerly issued by the Commission. The exclusion of "non-transportation revenue" detracts from the signifi-

cance of the final operating income. Something like \$5,000,000 of the payment for "Express privileges" goes to other transportation agencies than railways.

The lack of any detail in this statement conceals the fact that some 70% of the entire cost of operation goes to labor in one form or another.

THE FREIGHT TRAFFIC.

Moving freight the world over is the most important function of a common carrier. In the United States this has been developed to a degree unapproached in any other quarter of the globe. By reason of density of traffic and inferiority of equipment other countries may handle passengers more cheaply than we do, but in the movement of freight which brings the commodities of the most remote part of the Union within reach of all its inhabitants, the railways of the United States are without a peer on earth.

That is why the first summary under this title giving the ton mileage, revenue and receipts per ton mile from freight with the changes by percentages provides the real touchstone of adequate and reasonable transportation service by the railways of the United States.

SUMMARY OF FREIGHT MILEAGE, REVENUE AND RECEIPTS PER TON MILE, 1901 TO 1913.

Year	Number of Tons Carried One Mile	Increase over Preceding Year (Per Cent)	Freight Revenue	Increase over Preceding Year (Per Cent)	Receipts per Ton-Mile (Mills)
1901 Official.....	147,077,136,040		\$1,118,543,014		7.50
1902 "	157,289,370,056	6.9	1,207,228,845	7.9	7.57
1903 "	173,221,278,993	10.2	1,338,020,026	10.8	7.63
1904 "	174,522,089,577	.7	1,379,002,693	3.0	7.80
1905 "	186,463,109,510	6.9	1,450,772,838	5.2	7.66
1906 "	215,877,551,241	15.7	1,640,386,655	13.1	7.48
1907 "	236,601,390,103	9.6	1,823,651,998	11.2	7.59
1908* "	218,381,554,802	D 7.7	1,655,419,108	D 9.2	7.54
1909* "	218,802,986,929	.2	1,677,614,678	1.3	7.63
1910* "	255,016,910,451	16.6	1,925,553,036	14.8	7.53
1911* "	253,783,701,839	D .4	1,925,950,887	.0	7.57
1912* "	262,955,605,123	3.6	1,956,802,927	1.6	7.43
1913 (Bureau).....	300,558,334,000	14.3	2,184,533,834	11.6	7.27
Twelve years' in- crease.....		104.3%		95.3%	

NOTE.— In 1911 the miles of line represented was 246,238; in 1912, 240,238; and in 1913, 242,177.

* Excludes figures of switching and terminal companies

D = Decrease.

In this table the reader will perceive that performance has outrun recompense in these twelve years in the proportion of 104 to 95. It does not seem a very great difference, but had the railways received as much per ton mile in 1913 as in 1901, they would have been nearly \$70,000,000 better off at the end of the year. Or if they had received the average rate of 1904, from which point rates have been battered by selfish shipping interests, they would have been nearly \$160,000,000 better off on June 30th, last, and we would not now be waiting for a 5% raise to temper the wind to the shorn lamb.

The ton mile average shown in this table is the lowest, with one exception, in the record of the railways of the United States. That exception was in 1899 when it touched 7.24 miles. The railways became alarmed and sought to advance rates to preserve the margin of solvency. Their action brought on the agitation which resulted in giving the Commission authority over rates, which has been interpreted as power to change them in one direction only.

FREIGHT TRAFFIC BY GROUPS AND SINCE 1888.

In the next statement we present a summary of the freight traffic assignments in 1913 by original territorial groups of the Interstate Commerce Commission and the totals by years since 1888:

SUMMARY OF TONS CARRIED, TON MILEAGE, MILEAGE OF FREIGHT TRAINS, AVERAGE TONS IN TRAINS, FREIGHT REVENUES AND AVERAGE RECEIPTS PER TON MILE, BY GROUPS IN 1913 AND YEARLY SINCE 1888.

Territorial Division	Tons Carried (Millions)	Tons Carried One Mile (Millions)	Mileage Freight Trains (Millions)	Average Tons in Train	Average Haul per Ton (Miles)	Freight Revenue (Millions)	Receipts per Ton-Mile (Cents)
Group I.....	72	7,135	24	297	99	\$ 80	1.108
Group II.....	576	74,330	127	585	129	479	.645
Group III.....	492	62,986	113	557	127	358	.568
Group IV.....	115	23,692	41	577	206	131	.553
Group V.....	114	17,373	59	295	152	157	.905
Group VI.....	300	48,590	113	430	162	349	.717
Group VII.....	70	15,898	36	441	227	131	.822
Group VIII....	119	24,868	67	371	209	243	.978
Group IX.....	59	8,380	28	296	142	87	1.041
Group X.....	92	17,296	32	540	188	169	.984
U.S. 1913 (a)..	2,009	300,558	640	469	149	\$2,184	.727
1912 (a).....	1,766	261,416	605	430	148	1,936	.741
1911 (b).....	1,781	253,783	626	383	143	1,925	.757
1910 (b).....	1,849	255,016	635	380	138	1,925	.753
1909 (b).....	1,556	218,802	568	363	142	1,677	.763
1908 (b).....	1,532	218,381	587	352	144	1,655	.754
1907.....	1,796	236,601	629	357	132	1,823	.759
1906.....	1,631	215,877	594	344	132	1,640	.748
1905.....	1,427	186,463	546	322	131	1,450	.766
1904.....	1,309	174,522	535	308	133	1,379	.780
1903.....	1,304	173,221	526	311	133	1,338	.763
1902.....	1,200	157,289	499	296	131	1,207	.757
1901.....	1,089	147,077	491	281	135	1,118	.750
1900.....	1,081	141,596	492	270	130	1,049	.729
1899.....	943	123,667	(c) 507	243	131	913	.724
1898.....	863	114,077	503	226	132	876	.753
1897.....	728	95,139	564	204	130	772	.798
1896.....	765	95,328	479	198	124	786	.806
1895.....	696	85,227	449	189	122	729	.839
1894.....	638	80,335	446	179	125	699	.860
1893.....	745	93,588	508	183	125	829	.878
1892.....	706	88,241	485	181	124	799	.898
1891.....	675	81,073	446	181	120	736	.895
1890.....	636	76,207	435	175	119	714	.941
1889.....	539	68,727	383	179	127	644	.922
1888.....	480	61,329	348	176	128	613	1.001
Increase							
1888 to 1913..	319%	390%	84%	167%	16%	256%	D27.3%

(a) Bureau figures, 236,444 miles represented in 1912, 242,177 in 1913.

(b) Excludes figures of switching and terminal companies.

(c) Includes 75% of mixed train mileage, that being the practice prior to 1900.

D = Decrease.

The Bureau's figures for 1912 have been retained in this table because at this writing the complete official report for that year is not available.

The average receipts of 7.27 mills per ton mile shown in this table is the highest achievement of American railway efficiency. When it is considered that everything entering into the movement of one ton one mile costs from 10 to 30 per cent more than it did in 1899, when the previous low mark was touched, it challenges credulity, and it was only after examining the detail returns most carefully that it was accepted. When complete returns are in for all the smaller roads the final figure may be a point or two higher. Even then it will continue a marvel of cheap transportation. It should be compared with what is accomplished in other countries.

TON MILE RATES IN FOREIGN COUNTRIES.

In the following table the average receipts per ton mile has been compiled from the latest returns available for the countries named:

	Receipts per Ton-Mile Cents		Receipts per Ton-Mile Cents
United Kingdom (1912).....	2.39	Norway (1912).....	1.60
Germany (1911).....	1.39	Denmark (1912).....	2.13
France (1910).....	1.33	Holland (1911).....	1.36
Russia (1909).....	1.17	Belgium (1911).....	1.14
Austria (1911).....	1.45	Switzerland (1911).....	2.92
Hungary (1911).....	1.33	Spain (1909).....	2.46
Bulgaria (1911).....	1.76	New South Wales* (1913).....	1.76
Sweden (1909).....	1.65	South Australia (1913).....	1.94

*Omits terminal receipts, 23.01 cents per ton, 1913.

The British Rate is computed. The North Eastern Railway is the only English road giving ton mile unit. In 1911 it carried 31,653,944 tons an average of 23.13 miles, making the average of 2.33 cents per ton mile. Of its freight traffic 74% was minerals against 55% in the United States.

The course of freight rates in Germany for the last twenty-six years is shown in the following statement:

RECEIPTS PER TON AND TON MILE ON GERMAN RAILWAYS 1886 TO 1911.

	Per Ton	Per Ton-Mile		Per Ton	Per Ton-Mile
1911.....	\$0.84	\$0.0139	1902.....	\$0.88	\$0.0143
1910.....	0.85	.0141	1901.....	0.89	.0143
1909.....	0.86	.0141	1900.....	0.90	.0142
1908.....	0.87	.0141	1899.....	0.90	.0143
1907.....	0.86	.0140	1898.....	0.91	.0145
1906.....	0.87	.0141	1896.....	0.95	.0151
1905.....	0.87	.0142	1891.....	0.95	.0149
1904.....	0.89	.0142	1886.....	1.05	.0156
1903.....	0.88	.0142			

Throughout the period covered by this table the average haul in Germany has scarcely varied from 100 kilometers. Where a ton of freight was carried 62 miles in Germany in 1911 for an average of 84 cents, a ton of freight was carried 143 miles in the United States for \$1.08; and last year it was carried 149 miles for \$1.08 7-10ths. The average pay of a German railway employe would move a ton 81 miles on the government roads of that country; the average pay of an American railway employe would move it about 338 miles on the privately operated railways of the United States. This difference illustrates the difference between transportation efficiency in Germany and America.

PROPORTION OF COMMODITIES MOVED.

The next summary shows the relative amounts of the various classes of freight moved. Comparison of the percentages for the several classes is interesting:

SUMMARY OF TONNAGE AND PROPORTION OF DIFFERENT CLASSES OF COMMODITIES MOVED, 1911, 1912 AND 1913.

Class of Commodity	1911 Official		1912 Bureau		1913 Bureau	
	Tonnage Reported as Originating on Line	Per Cent of Aggregate	Tonnage Reported as Originating on Line	Per Cent of Aggregate	Tonnage Reported as Originating on Line	Per Cent of Aggregate
Products of Agriculture	85,566,053	8.85	99,291,518	9.89	111,432,907	9.74
" " Animals	23,763,262	2.46	27,300,895	2.72	27,995,643	2.45
" " Mines	539,255,980	55.75	560,005,036	55.81	637,214,821	55.74
" " Forests	108,506,272	11.22	97,526,945	9.73	112,205,406	9.81
Manufactures	135,175,536	13.97	143,758,324	14.32	168,245,171	14.71
Merchandise	36,519,321	3.77	42,467,790	4.23	44,755,180	3.91
Miscellaneous	38,447,567	3.98	33,001,548	3.30	41,684,328	3.64
Total	967,233,991	100.00	1,003,352,056	100.00	1,143,433,456	100.00

The next table giving the percentages of the various commodities carried, as arrived at through a succession of statements like that preceding for the years 1901 to 1913, shows how the proportions fluctuate from year to year and yet preserve approximately the same relative proportions:

SUMMARY SHOWING PERCENTAGE OF FREIGHT TRAFFIC MOVEMENT
BY CLASSES OF COMMODITIES, 1901 TO 1913.

Year	Low Rate Freight Percentage of Aggregate					High Rate Freight Percentage of Aggregate			
	Prod- ucts of Agri- culture	Ani- mals	Mines	Forest	Total	Manu- factures	Mer- chan- dise	Miscel- laneous	Total
1901 Official . . .	10.76	2.91	51.67	11.67	77.01	13.75	4.16	5.08	22.99
1902 "	9.23	2.64	52.36	11.64	75.87	14.49	4.37	5.27	24.13
1903 "	9.56	2.63	51.56	11.67	75.42	14.39	4.69	5.50	24.58
1904 "	9.59	2.74	51.56	12.53	76.42	13.41	4.83	5.34	23.58
1905 "	9.03	2.54	53.59	11.24	76.40	13.60	4.32	5.68	23.60
1906 "	8.56	2.32	53.09	11.24	75.21	14.81	4.06	5.92	24.79
1907 "	8.62	2.29	53.39	11.38	75.68	15.41	3.89	5.02	24.32
1908 "	8.74	2.46	55.72	11.35	78.27	13.15	4.04	4.54	21.73
1909 "	8.92	2.49	55.60	11.75	78.76	13.15	4.11	3.98	21.24
1910 "	8.13	2.10	56.23	11.67	78.13	14.42	3.69	3.76	21.87
1911 "	8.85	2.46	55.75	11.22	78.28	13.97	3.77	3.98	21.72
1912 Bureau . . .	9.89	2.72	55.81	9.73	78.15	14.32	4.23	3.30	21.85
1913 "	9.74	2.45	55.74	9.81	77.74	14.71	3.91	3.64	22.26

It may be of interest to compare the proportion the carrying of minerals in the United States bears to the whole traffic, ranging from 51.56% to 56.23%, with the proportion reported for the United Kingdom in 1912, viz. 77%. This should dispel the popular illusion that our freight rates are so much lower than English rates, because of the great preponderance of our mineral traffic.

TRAFFIC AND RECEIPTS FROM SELECTED COMMODITIES.

For several years the Commission has endeavored to present figures showing the average receipts per ton mile for certain selected commodities. The result has not been entirely satisfactory because of the incompleteness of the returns. But as given below it affords an interesting illustration of the different rates paid by the several commodities.

SUMMARY OF SELECTED COMMODITIES FOR THE YEAR ENDING JUNE 30, 1911; 151,013 MILES REPRESENTED.

Commodity	Freight Carried in Carload Lots Tons	Ton Mileage of Freight Carried in Carload Lots	Revenue from Freight Carried in Carload Lots	1911 Average Receipts per Ton per Mile from Same, Cents	1910 Average Receipts per Ton per Mile from Same, Cents
Grain.....	40,332,497	9,143,076,658	\$57,261,674	0.626	0.630
Hay.....	6,728,477	1,092,114,036	11,079,426	1.014	1.019
Cotton.....	5,334,467	1,048,505,055	17,992,687	1.716	1.823
Live Stock.....	12,207,903	2,735,800,399	33,222,772	1.214	1.217
Dressed Meats....	2,629,770	806,813,533	7,741,705	0.960	0.904
Anthracite Coal...	31,782,378	5,739,725,082	32,711,250	0.570	0.589
Bituminous Coal...	243,746,994	31,255,991,847	146,358,912	0.468	0.495
Lumber.....	78,978,222	13,765,969,134	96,537,192	0.701	0.734

Only the most general deductions can be drawn from these figures. The averages follow the most obvious lines and are regulated by the character, value, and quality of the service.

RATES IN NEW SOUTH WALES.

They do, however, afford a basis for comparison with the average rates received for the conveyance of some of the same commodities by the government railways of New South Wales, as set forth in the next summary:

STATEMENT OF AVERAGE HAUL AND TON MILE RECEIPTS ON THE RAILWAYS OF NEW SOUTH WALES FOR YEARS ENDING JUNE 30, 1912 AND 1913.

Commodity	1912		1913	
	Average Haul Miles	Receipts per Ton Mile (Cents)	Average Haul Miles	Receipts per Ton Mile (Cents)
Coal and Shale.....	27.02	.96	28.12	.94
Firewood.....	30.16	1.50	28.09	1.60
Grain and Flour.....	259.30	.70	239.74	.78
Hay, Straw and Chaff.....	217.13	.74	199.89	.74
Wool.....	302.11	3.84	304.80	3.86
Live Stock.....	262.06	2.12	266.63	1.96
General Merchandise (including all other Goods).....	93.78	2.90	140.04	2.86
Total.....	81.08	1.78	75.60	1.76

To the average receipts per ton mile should be added approximately one-third of a cent per ton mile to cover terminal charges, not included in the above statement. Unfortunately it is not possible to allocate this among the several commodities.

VIII

EARNING AND EXPENSES

In introducing this section, which covers the financial results of the investment, operation and service of the railways for the year 1913, it seems timely to recall the views of Prof. Adams, for twenty-one years Statistician to the Commission, as to what it should consist of. In 1888 he said:

"This table, which exhibits earnings and income, conforms to the usual method of classification, so far as earnings from operation are concerned, and departs only from the ordinary custom in placing by the side of such earnings income from permanent investments in property not operated. For the railway manager, whose interest centers in operating earnings and operating expenses, that part of the table, which deals with income from stocks and bonds owned, or from rentals, is of slight importance."

The table itself was very brief and incomplete and dealt with "total earnings from operation" of \$910,621,220. In 1900 Prof. Adams, in the light of his twelve years' experience in dealing with the same section, said:

"The income account of railways is presented in two ways: First, on the assumption that the railways in the United States are part of a single system, **in which case there can be no duplications** on account of intercorporate payments; second, in conformity with the reports of the carriers as rendered, in which case numerous duplications, both in income and expenditure, find their way into the statements. While the final result of the two systems of compilation is the same, because duplications of income in the second statement are offset by duplications of expenditures; **it is to the first statement, however, that one should turn for a correct impression of the earnings and expenditures of railways during the year covered by this report.**"

In 1909, in the last report to which his signature was attached, Prof. Adams preserved this correct method of treating this important matter, saying:

"A simple compilation of debits and credits as returned by carriers in their annual reports would result in duplications on both sides of the account, and while the final result, that is to say, the debit and credit balance, would be correct, it would not be possible to accept any particular figure affected by intercorporate payments as a true measure of an item in question. . . . The statement which immediately follows presents an income account of the railways of the United States as it would be if the Government or a single corporation owned all the railways, and if, as a result of such a consolidation, all intercorporate contracts or interests were canceled."

Following the practice, approved by reason and experience, the next summary presents the income account of the railways of the United States considered as a system for the year 1913 compared with 1911, the last available official figures:

COMPARATIVE INCOME ACCOUNT OF THE RAILWAYS IN THE UNITED STATES, CONSIDERED AS A SYSTEM FOR THE YEARS ENDING JUNE 30, 1913 AND 1911.

Item	Amount	
	1913 Bureau Figures	1911 Official Figures (a)
Miles represented.....	242,177	246,238
Operating Revenue:		
From passengers.....	\$691,802,201	\$657,638,291
From freight.....	2,184,533,834	1,925,950,887
From mail.....	50,053,481	50,702,625
From express.....	78,536,196	70,725,137
Other revenue from operation..	114,003,606	84,744,729
Total revenues from operation	\$3,118,929,318	\$2,789,761,669
Operating expenses:		
Maintenance, way and structures	418,023,647	366,025,262
Maintenance of equipment....	511,143,844	428,367,306
Traffic expenses.....	62,687,583	59,166,364
Transportation expenses.....	1,096,553,027	987,382,108
General expenses.....	76,443,109	74,112,965
Taxes (b).....	129,052,922	108,309,512
Total expenses and taxes....	2,293,904,132	2,023,363,517
Net revenues from operation.....	\$25,025,186	766,398,152
Net revenues from outside operations.....	1,603,610	1,815,193
Total operating income.....	\$26,628,796	768,213,345
Disposition:		
Interest on funded debt.....	379,921,455	361,242,986
Interest on current liabilities..	26,814,237	21,312,076
Rent paid for lease of road (b)..	122,522,882	119,905,493
Additions and betterments charged to income.....	57,683,865	48,190,989
To other reserves.....	11,491,978	6,888,747
Other deductions.....	34,315,633	35,669,222
Deficits of weak companies....	40,452,070	???
Total deductions.....	673,202,120	593,209,513
Income available for dividends and surplus.....	153,426,676	175,003,832

(a) Does not include returns for switching and terminal roads.

(b) Includes taxes paid by lessor companies, a like sum being deducted from "Rent."

Followers of the water-on-the-brain school of economists will search this table in vain for the \$460,195,376 of dividends officially stated to have been declared by the railways in 1911, or any similar sum that may be declared on the same authority in 1913. It was not there, and it will not be there, because every cent of railway revenues received from passenger fares and freight rates is accounted for in this brief statement.

It is not only possible but probable that \$70,000,000 should be transferred from the deduction on account of interest on funded debt to the balance "available for dividends and surplus" in both years, because this deduction is swelled out of "income from other sources." The sum of \$70,000,000 is named, because the operating railways own funded debt of other railways to the amount of \$1,729,-739,061, on which they might receive 4 per cent in interest.

The leased roads to which the operating roads pay the item for rent in the above table paid out \$53,503,027 in dividends in 1912. Presumably they paid a like amount in 1913, which also could be transferred from the rent item to the balance item. These two transfers would make the balance available for "dividends and surplus" in 1913 consist of the following items:

Balance as above.....	\$153,426,678
Transferred from interest item.	70,000,000
Transferred from rent item.	54,000,000

Available for dividends and surplus \$277,426,678

How much of this was available for dividends all depends on what sum sound business principles would require and retain for surplus. Of this the writer is no judge. If \$50,000,000 were a reasonable sum it would leave \$217,000,000 as the share of the balance available for dividends.

But there is no way in which the sum of \$3,118,929,318 received from transportation can be juggled by which it can pay operating expenses, taxes, fixed charges, take care of depreciation and reserves and have more than some such sum as \$280,000,000 for dividends — and this leaves nothing for surplus and other contingencies.

OTHER INCOME.

Aside from the revenues derived from the carrying of passengers, freight, mail and express, and other transportation services, the 433 railway companies reporting to this Bureau in 1913 received no less than \$279,868,243 in what is officially known as "Other income." This consists in the main of interest and dividends received from railway bonds and stocks owned. In 1911 the Commission reported that the operating roads received \$193,059,874 as dividends on stocks owned or controlled; \$36,428,719 interest on funded debt owned or controlled, and \$30,390,998 on other securities, loans accounts — a total of \$259,779,491.

DISTRIBUTION OF TRANSPORTION REVENUES.

What becomes of that dollar is shown in the next statement covering the gross earnings (\$3,118,929,318) of the railways reporting to this Bureau in 1913 in greater detail than appears in the income account, in comparison with a similar division of earnings in 1911 and 1907:

SUMMARY SHOWING THE DISTRIBUTION OF GROSS EARNINGS OF 242,177 MILES OF OPERATED LINE IN 1913, COMPARED WITH THE PERCENTAGES FOR 1911 AND 1907.

Item	Mileage		Gross Earnings		
	1913.....	242,177	\$3,118,929,318		
	1911.....	246,238	2,789,761,669		
	1907.....	227,671	2,589,105,578		
	Amount 1913	Per Cent of Gross Earnings			
		1913	1911	1907	
Operating Expenses:					
Maintenance of Way and Structures...	\$ 418,023,647	13.40	13.12	13.27	
Maintenance of Equipment.....	511,143,844	16.39	15.35	14.22	
Traffic Expenses.....	62,687,583	2.01	2.13	37.50	
Transportation Expenses.....	1,096,553,027	35.16	35.40		
General Expenses.....	76,443,109	2.45	2.64	2.54	
Total.....	\$2,164,851,210	69.41	68.64	67.53	
Disposition of Same:					
Pay of Employes.....	1,373,420,654	44.05	43.33	41.42	
Fuel for Locomotives.....	249,197,493	7.98	8.31	7.74	
Oil and Water for Locomotives.....	20,683,351	.66	.63	.88	
Loss, Injuries and Damage.....	70,606,081	2.26	2.17	1.83	
Material for Way and Structures.....	50,943,631	14.46	14.20	15.66	
Supplies and Expenses.....					
Stationery and Printing.....					
Law Expenses.....					
Advertising.....					
Insurance.....					
Miscellaneous, Including Hire and Rent of Equipment, etc.....					
Total Expenses.....	\$2,164,851,210	69.41	68.64	67.53	
Taxes — (a).....	129,052,922	4.14	3.88	3.10	
Rental of Leased Roads.....	122,522,882	3.92	4.30	4.69	
Interest on Funded Debt and Current Liabilities.....	406,735,692	13.04	13.71	13.14	
Deficit of Weak Companies.....	40,452,070	1.30	.....	.19	
Betterments and Reserves.....	69,175,843	2.22	1.97	1.50	
Other Deductions.....	34,315,633	1.10	1.29	1.07	
Dividends and Surplus.....	153,426,676	4.92	6.27	8.78	
Total.....	\$3,120,532,928	100.05	100.06	100.00	
Deduct Net Outside Operations.....	1,603,610	.05	.06	.....
Gross Operating Revenues.....	3,118,929,318	100.00	100.00	.....

(a) Includes taxes for leased roads deducted from rent.

The failure of official statistics to make a definite separation of materials and supplies from other expenses is to be regretted. The report for 1911 showed \$98,342,626 expended by Class I roads for ballast, ties, rails and other track material and \$65,685,795 for supplies and expenses.

The student is at liberty to adjust the item for dividends and surplus by adding thereto the deductions from interest (\$70,000,000) and rent (\$54,000,000) as explained on page 96, but in doing so he must be careful not to put into the railway dollar anything which is not received from transportation service. To do so is to become lost in an Iownian fog of intercorporate duplication in which high reputations for truth and veracity have perished.

DISTRIBUTION OF THE ITEM OF RENT.

How this was done is shown in the following official summary of the income account of non-operating roads for the years ending June 30, 1911 and 1912:

CONDENSED INCOME AND PROFIT AND LOSS ACCOUNTS OF LEASED
ROADS FOR THE YEARS ENDING JUNE 30, 1911 AND 1912.

INCOME ACCOUNT	1911		1912	
Gross Income from Lease of Road.....	\$120,773,004		\$124,533,101	
Salaries and Maintenance of Organization.....	418,987		352,898	
Taxes Accrued.....	5,652,335		6,777,870	
Net Income from Lease of Road.....		\$114,701,662		\$117,402,333
Other Income.....		4,464,549		6,495,874
Gross Corporate Income.....		\$119,166,211		\$123,898,207
Interest and Similar Deductions from Gross Income.....		62,996,507		69,754,356
Net Corporate Income.....		\$56,169,704		\$54,143,851
Disposition of Net Corporate Income:				
Dividends Declared from Current Income.....	\$36,112,797		\$37,556,473	
Appropriations for Additions and Betterments and for New Lines or Extensions.....	1,927,422		1,084,221	
Appropriations for Other Reserves.....	8,000		16,783	
Total.....		38,048,219		38,657,477
Balance to Credit of Profit and Loss.....		\$18,121,485		\$15,486,374
PROFIT AND LOSS ACCOUNT				
Credit Balance on June 30, 1910 and 1911.....	(a)	\$72,567,921	(b)	\$66,257,33
Credit Balance for Year 1911 and 1912 from Income Account.....		18,121,485		15,486,374
Total.....		\$90,689,406		\$81,743,713
Dividends Declared out of Surplus.....		20,559,380		15,946,554
Difference.....		\$70,130,026		\$65,797,159
Other Profit and Loss Items—				
Debit Balance.....		1,483,530		12,406,243
Balance Credit June 30, 1911 and 1912, Carried to Balance Sheet.....		\$68,646,496		\$53,390,916

(a) This balance in the report for 1910 was given as \$71,828,321.

(b) This balance in the report for 1911 was given as \$68,646,496.

It will not escape notice that the balance carried forward on June 30, 1912, is some \$13,000,000 less than that brought forward at the beginning of the year, or that the sum of the dividends declared out of current income and out of surplus (\$53,503,027) was within \$700,000 of the entire net corporate income for the year.

IX TAXES

The 433 companies reporting to the Bureau, operating 242,177 miles of line, of which they owned 202,336, paid \$122,275,052 taxes in 1913. To this has been added \$6,777,870 paid by their lessor companies in 1912 to represent taxes paid on 39,841 miles of leased road, making a total of \$129,052,922 or \$532 per mile.

The following statement presents a review of taxes paid by the railways of the United States during the past twenty-five years:

SUMMARY OF TAXES PAID BY THE RAILWAYS OF THE UNITED STATES SINCE 1889, ANNUALLY PER MILE AND RELATIVELY.

Year	Taxes Paid	Per Mile	Percentage of Earnings
1913 (Bureau Figures).....	\$129,052,922	\$532	4.14
1912 " ".....	118,153,819	499	4.21
1911* (Official Figures).....	108,309,512	442	3.88
1910*.....	103,795,701	431	3.77
1909*.....	90,529,014	384	3.74
1908*.....	84,555,146	367	3.53
1907.....	80,312,375	353	3.10
1906.....	74,785,615	336	3.21
1905.....	63,474,679	292	3.04
1904.....	61,696,354	290	3.12
1903.....	57,849,569	281	3.04
1902.....	54,465,437	272	3.15
1901.....	50,944,372	260	3.20
1900.....	48,332,273	250	3.24
1899.....	46,337,632	247	3.53
1898.....	43,828,224	237	3.51
1897.....	43,137,844	235	3.84
1896.....	39,970,791	219	3.48
1895.....	39,832,433	224	3.70
1894.....	38,125,274	211	3.56
1893.....	36,514,689	215	2.99
1892.....	34,053,495	209	2.90
1891.....	33,280,095	206	3.04
1890.....	31,207,469	199	2.96
1889.....	27,590,394	179	2.86
Aggregate Taxes 25 Years.....	\$1,540,135,025	.....	.....
Percentage of Increase.....	367%	197%	44.7%

*Does not include switching and terminal companies.

On the authority of the census experts that 74 cents per \$100 is approximately the average throughout the country, this table amounts to a certificate of an assessed value of nearly \$72,000 per mile for the railways of the United States, or an aggregate value of over \$18,000,000,000.

X

DAMAGES AND INJURIES TO PERSONS

The upward trend of the unremunerative expenditures on account of injuries to persons and loss and damage to property so noticeable in 1911 and 1912 continued in a marked degree in 1913, as the following statement shows:

SUMMARY OF PAYMENTS ON ACCOUNT OF INJURIES TO PERSONS AND LOSS AND DAMAGE DURING THE YEARS 1913 AND 1911.

Account	Amount 1913 Bureau	Amount 1911 Official	Percentage of Earnings	
			1913	1911
Injuries to Persons—				
Maintenance of Way.....	\$ 3,013,975	\$ 1,954,873		
Maintenance of Equipment.....	2,310,053	1,642,371		
Transportation.....	25,570,684	22,437,139		
Total.....	\$30,894,712	\$26,034,383	.99	.93
Loss and Damage—				
To Freight.....	31,058,271	24,209,081		
To Baggage.....	413,212	298,697		
To Property.....	4,067,221	4,958,546		
To Live Stock, etc.....	4,172,665	4,048,894		
Undistributed.....		882,061		
Total Loss and Damage.....	\$39,711,369	\$34,397,279	1.29	1.23
Grand Total.....	\$70,606,081	\$60,431,662	2.26	2.16

The total for the two accounts in 1913 showed an increase of \$8,767,945 over the Bureau's returns for 1912. Of this increase no less than \$3,253,861 was in injuries to persons, showing that the various Compensation and Employer's liability laws are already beginning to increase the burdens of civilization on the railways in this respect. The increase amounted to nearly 12% for the year against an increase of a little more than 8% in traffic. The gap between these percentages is significant of how increased expenses lie in wait for the railways at every turn.

The next table illustrates how steadily these expenditures have grown both absolutely and relatively.

PAYMENTS ON ACCOUNT OF "LOSS AND DAMAGE" AND "INJURIES TO PERSONS" 1899 TO 1913 AND PROPORTION TO GROSS EARNINGS.

Year	Loss and Damage		Injuries to Persons	
	Amount	Per Cent of Earnings	Amount	Per Cent of Earnings
1899.....	\$ 5,976,082	.455	\$ 7,116,212	.541
1900.....	7,055,622	.474	8,405,980	.565
1901.....	8,109,637	.510	9,014,144	.567
1902.....	11,034,686	.639	11,682,756	.676
1903.....	13,726,508	.722	14,052,123	.739
1904.....	17,002,602	.861	15,838,179	.802
1905.....	19,782,692	.946	16,034,727	.770
1906.....	21,086,219	.907	17,466,864	.751
1907.....	25,796,083	.996	21,462,504	.829
1908.....	34,631,243	1.447	20,088,543	.839
1909.....	32,922,986	1.386	23,456,038	.988
1910.....	30,707,675	1.134	23,284,145	.859
1911.....	34,397,279	1.233	26,034,383	.933
1912.....	34,197,285	1.220	27,640,851	.985
1913.....	39,711,369	1.273	30,894,712	.991
Increase in 14 years, per cent.....	565%	177%	334%	85%

The percentages of increase tell their own story of how these charges over which the railways have little control eat into the receipts. In the fourteen years under review, the payments on account of loss and damage have increased over sixfold and they have almost tripled in proportion to the increase in traffic.

In Germany in 1911 the payments on account of indemnities and accident insurance amount to less than \$5,000,000 annually and the employes contribute to the funds out of which they are paid.

In the British Isles the railways for the calendar years 1912 and 1911 made the following payments:

	1912	1911
Compensation to Employes.....	\$1,539,260	\$1,427,362
Compensation for Personal Injuries to Passengers.....	663,946	665,094
Compensation for Damage to or Loss of Goods.....	2,793,062	2,138,037
Total.....	\$4,996,268	\$4,230,493
Proportion to Revenues.....	0.86%	0.74%

Between 1899 and 1912 the payment of British roads on these accounts increased only 43% against an increase of 440% in the United States between 1899 and 1912.

XI

LOCOMOTIVE FUEL

According to the returns to this Bureau for the year ending June 30, 1913, the 433 roads reporting paid \$249,197,493 for locomotive fuel, an increase of \$18,641,949 over the amount paid in 1912. Of the total, \$35,889,999 was paid for fuel for yard locomotives and \$213,307,494 for road locomotives against \$31,880,033 and \$198,-675,511 respectively in 1912.

The following summary gives the expenditure of the railways for fuel since 1899, together with the proportion to operating expenses and gross earnings during that period:

SUMMARY OF COST OF LOCOMOTIVE FUEL AND PROPORTION TO EARNINGS AND EXPENSES OF AMERICAN RAILWAYS, 1913 TO 1899, WITH PRICE OF BITUMINOUS COAL PER TON DURING THE SAME PERIOD.

Year	Miles of Line	Cost of Locomotive Fuel	Proportion to Operating Expenses	Proportion to Gross Earnings	Price of Coal at Mines per Ton*
1913 Bureau Figures	242,177	\$249,197,493	11.516	7.98	.....
1912 " "	236,444	230,555,544	11.850	8.22	1.15
1911 Official "	246,238	232,622,502	12.147	8.34	1.11
1910 "	240,830	217,780,953	11.953	7.92	1.12
1909 "	235,402	188,735,868	11.804	7.81	1.07
1908 "	230,494	201,905,054	12.097	8.44	1.12
1907 "	227,454	200,261,975	11.471	7.74	1.14
1906 "	222,340	170,499,133	11.119	7.34	1.11
1905 "	216,973	156,429,245	11.278	7.51	1.06
1904 "	212,243	158,948,886	11.893	8.05	1.10
1903 "	205,313	146,509,031	11.675	7.70	1.24
1902 "	200,154	120,074,192	10.776	6.96	1.12
1901 "	195,561	104,926,568	10.602	6.61	1.05
1900 "	192,556	90,593,965	9.809	6.09	1.04
1899 "	187,534	77,187,344	9.478	5.88	.87

*These figures are from the latest report of the United States Geological Survey.

In the report of the United States Geological Survey for the year 1912 it was said that the production of coal in the United States that year "not only surpassed all previous tonnage records, but the average value per ton exceeded that of any normal year in the 33 years for which statistics are available."

In England only 5.24% of operating revenues has to be expended on fuel for locomotives. The chief reason for the difference is that in the United States the passenger journey is three times longer and the freight haul nearly six times longer, while the ton mile rate is only one third.

XII

ACCIDENTS

A thing may not happen in a year and yet may happen within two minutes.—
Old Spanish Proverb.

Four roads reporting to this Bureau with a combined mileage of 1,411 miles have been operated ten consecutive years in the United States without a single fatality to a passenger in a train accident. Last year there were nine roads operating 4,379 miles with a similar immunity and one of them, the Lackawanna, had a clear record for twelve consecutive years before the Corning collision. But the most carefully carried and guarded pitcher that goes to the well continuously meets with the inevitable disaster. The laws of force, weight and risk never forget.

THE SAFETY OF AMERICAN RAILWAYS.

Owing to the change in the Commission's statistics of railway accidents in not requiring them to be included in annual reports, it has become increasingly difficult to secure complete data for the Bureau's immunity statements. The accidents and not the safety of American railways make more sensational official copy for the newspapers. Nevertheless more than two-thirds of the roads making returns to this Bureau reported going through the year 1913 without one fatality to a passenger in a train accident. These roads operated a mileage greater than the combined mileage of the United Kingdom, Germany, France, Austria and Italy.

The true nature of this achievement can only be comprehended by studying the traffic conditions as given in the following statement compared with the figures for 1912 and 1909, the last year that the Commission required annual returns of accidents:

SUMMARY OF MILEAGE AND TRAFFIC OF ROADS ON WHICH NO PASSENGER WAS KILLED IN A TRAIN ACCIDENT DURING THE YEARS 1913, 1912 AND 1909.

	1913	1912	1909
Number of Operating Companies.....	299	290	347
Mileage of these Companies.....	120,901	101,164	159,657
Passengers Carried.....	409,808,488	332,184,818	570,617,563
Passengers Carried 1 Mile.....	14,400,992,000	11,218,221,000	18,953,025,000
Tons of Freight Carried.....	968,764,956	867,909,428	1,116,877,052
Tons of Freight Carried 1 Mile.....	141,790,227,000	105,580,384,000	151,974,495,000
Passengers Killed in Train Accidents.....	None	None	None
Passengers Injured in Train Accidents.....	3,724	3,525	2,585

The roads included in this roll of safety for 1913 operated in every state of the Union, so as a whole they had no exceptional conditions. The roll includes single roads of greater mileage than that of the minor states of Europe and four of them combined have as great a mileage as the British Isles. In the matter of safety, the block system has contributed its share but the majority of this mileage consisted of single track road where a high degree of safety was attained through automatic and intelligent observance of rules.

A REMARKABLE TEN YEAR RECORD OF IMMUNITY.

For ten years this Bureau has been keeping a record of roads operating without fatalities to passengers in train accidents. In fact, it was through the study of railway accidents that the Bureau made its first incursion into the field of railway statistics. As a result of this study it is able to present the following table of immunity from fatalities:

STATEMENT SHOWING NUMBER OF RAILWAYS AND MILEAGE ON WHICH NO PASSENGER HAS BEEN KILLED IN A TRAIN ACCIDENT, 1904 TO 1913.

Period		Number of Companies	Miles of Line with No Fatalities to Passengers in Train Accidents
Ten	Years—1904–1913 Inclusive.....	4	1,411
Nine	" —1905–1913 "	33	7,379
Eight	" —1906–1913 "	57	10,832
Seven	" —1907–1913 "	67	11,552
Six	" —1908–1913 "	87	18,860
Five	" —1909–1913 "	107	28,592
Four	" —1910–1913 "	122	30,897
Three	" —1911–1913 "	153	42,986
Two	" —1912–1913 "	205	63,714
One	" — 1913.....	299	120,901

The true significance of this statement becomes more impressive when it is considered that the figures relate to consecutive immunity of the same roads for each period. It means that there was an American mileage greater than that of Austrian roads operated without a fatality to a passenger in a train for six years; a mileage greater than that of the British Isles operated with similar immunity for five years, and a mileage greater than that of the German Empire operated with like immunity for three years. It would be well for the detractors of American railways to ponder these figures.

15 ROADS WITHIN ONE OF PERFECT IMMUNITY.

By that mischance which sets all precautions at defiance, there were 15 roads in the United States operating a mileage greater than all the government railways of Australia and New Zealand that came within a single life each of going through the year without a single fatality to a passenger in a train accident. The traffic conditions on these roads were as follows:

SUMMARY OF MILEAGE AND TRAFFIC OF ROADS ON WHICH ONLY ONE PASSENGER WAS KILLED IN A TRAIN ACCIDENT DURING THE YEARS 1913, 1912 AND 1909.

	1913	1912	1909
Number of Operating Companies.....	15	14	10
Mileage of these Companies.	25,361	23,105	27,681
Passengers Carried.....	73,639,499	58,194,180	185,447,507
Passengers Carried 1 Mile.....	3,113,427,000	3,150,736,000	5,778,621,000
Tons of Freight Carried.....	174,339,862	116,381,967	213,086,612
Tons of Freight Carried 1 Mile.....	29,003,500,000	22,898,165,000	40,177,881,000
Passengers Killed in Train Accidents.....	15	14	10
Passengers Injured in Train Accidents.....	1,157	731	778

There was one system included in this list of almost perfect immunity from fatalities to passengers in train accidents that operated a mileage greater than that of the state roads of Belgium, Holland and Switzerland combined.

Combining the totals of the tables of perfect immunity and solitary fatality in passenger train accidents, the reader has a total of 314 roads with a mileage of 146,262 miles with only 15 fatalities to passengers in train accidents in 1913. The first report of the Interstate Commerce Commission, 1888, covered officially only 139,101 miles, and the second report covering 149,948 miles placed the number of passengers killed in train accidents at 161.

RAILWAY ACCIDENTS.

It is not, however, in the statistics of safe railway operation that official statisticians are chiefly interested, but in those that admit of the most sensational exploitation in the public prints. Not content with the inevitable increase of casualties in the wake of an enormous increase intraffic, the requirements of reporting accidents have been so altered in recent years as to obscure the truth about fatalities in a perfect cloudburst of miscellaneous petty casualties.

Nothing could better illustrate the change that has come across

the face of official reports of accidents than a comparison of the figures of ten years ago and to-day, as follows:

1903 Killed in railway accidents	9,840;	injured	76,553
1913 Killed in railway accidents	10,964;	injured	200,308
Increase	1,124		123,755
Per cent	11.4%		161.6%

The figures of killed are a convincing testimonial to the remarkable decrease in fatalities relatively to traffic — passenger traffic increased 74.7% and freight 73.2% — whereas the figures of injured are a travesty on statistics. Moreover the contrast between the number of injured reported in 1913 and 1903 does not do justice to the mockery of statistical methods paraded annually in the official reports of injured, for in 1901 the Commission made a radical change in the definition of a reportable injury which boosted the figures from 50,320 in 1900 to 76,553 in 1903, an increase of over 52% in three years, where the increase in fatalities had been only 12.4%, coincident with an increase of 30% in passenger traffic and over 22% in freight traffic.

Warning the student against drawing any conclusions from the figures relating to injuries, the following statement presents the Commission's report of casualties to persons for steam railways for the year ending June 30, 1913, and the killed and injured by years since 1899:

SUMMARY OF CASUALTIES TO PERSONS IN RAILWAY ACCIDENTS FOR
THE YEARS 1913 AND 1912, AND ANNUAL FIGURES SINCE 1899.

	1913		1912	
	Killed	Injured	Killed	Injured
Passengers—				
In Collisions.....	119	3,902	49	4,184
Derailments.....	22	3,513	65	3,956
Other Accidents to Trains.....	.....	100	.....	76
Other Causes.....	195	6,892	156	6,125
Total Passengers.....	336	14,407	270	14,291
Employees—				
In Collisions.....	302	3,935	292	3,592
In Derailments.....	244	2,806	251	3,015
In Other Accidents to Trains.....	51	1,311	78	1,716
In Coupling Accidents.....	195	3,360	192	3,235
Overhead Obstructions, etc.....	96	1,844	77	1,523
Falling from Cars, Getting on or off Cars, etc.....	575	16,157	573	13,874
Other Causes.....	1,543	29,338	1,505	24,260
Total Employees on Duty.....	3,006	58,751	2,968	51,215
Total Passengers and Employees on Duty.....	3,342	73,158	3,238	65,506
Employees not on Duty—				
In Train Accidents.....	12	146	20	156
In Coupling Accidents.....	.....	1	.....	2
Overhead Obstructions, etc.....	2	9	1	12
Falling from Cars, etc.....	65	408	53	312
Other Causes.....	283	614	241	477
Total.....	362	1,178	315	959
Other Persons, Not Trespassing—				
In Train Accidents.....	9	110	13	277
Other Causes.....	1,279	5,932	1,185	4,746
Total.....	1,288	6,042	1,198	5,023
Trespassers—				
In Train Accidents.....	90	174	91	151
Other Causes.....	5,468	6,136	5,343	5,536
Total.....	5,558	6,310	5,434	5,687
Total Accidents Involving Train Operation.....	10,550	86,688	10,185	77,175
Industrial Accidents, not Involving Train Operation.....	414	113,620	400	92,363
Grand Total.....	10,964	200,308	10,585	169,538
1911.....	10,396	150,159	.....	.....
1910.....	9,632	119,507	.....	.....
1909.....	8,722	95,626	.....	.....
1908.....	10,188	104,230	.....	.....
1907.....	11,839	111,016	.....	.....
1906.....	10,618	97,706	.....	.....
1905.....	9,703	86,008	.....	.....
1904.....	10,046	84,155	.....	.....
1903.....	9,840	76,553	.....	.....
1902.....	8,558	64,662	.....	.....
1901.....	8,455	53,339	.....	.....
1900.....	7,865	50,320	.....	.....
1899.....	7,123	44,620	.....	.....

The most cursory analysis of the figures for 1913 should impress the reader with the fact that only 759, or 7%, of the reported fatalities were directly chargeable to some failure, defect or mischance in railway operation. The balance, or 93%, were due to some failure, negligence or mischance on the part of the individual victims.

Among the most prolific causes of the fatalities charged to railways are those coming under the head of "falling from cars or engines" and "getting on or off cars or engines." No less than 135 of the 195 fatalities to passengers attributed to "other causes" came under these two "causes." This number exceeds by 16 the total of passenger deaths resulting from collisions. All told there were 1,747 persons who went to their deaths in 1913 from falling off or while getting on railway cars. The death toll for this sort of carelessness or recklessness is double that of passengers, employes, trespassers and other persons killed in train accidents, and only universal education and admonitions beginning at the cradle and continuing to the grave can have much preventive effect.

But deaths from trespassing continue to be the chief contributors to the mortality charged against railway operation in the United States. A total of 5,558 out of 10,964, including industrial accidents, or over 50%, shows the effect of a nation-wide disregard of the warning not to trespass on railway property. In commenting on the government regulations as to crossing railway tracks in Germany, our Consul-General, A. M. Thackara, at Berlin remarks: "Like all laws and regulations in Germany, the foregoing are enforced. I have never seen even a pedestrian attempt to cross the tracks after the alarm bell has sounded or the watchman has begun to lower the gates."

If laws and regulations were enforced in the United States as in Germany, the death toll in every branch and incident of railway operation, except train accidents, would be reduced one-half.

The only effect of the "Safety First" campaign — which is known to have produced most gratifying results on every road where it has been inaugurated — when seen through the Commission's statistical spectacles, is to swell the totals of reported injuries. Under the head of "While doing other work (than coupling) about trains (not in shops or engine houses) or while attending switches," 143 employes were reported as killed and 24,114 injured. Any definition of an injury responsible for such a disproportion between killed and injured as this, or the 414 killed to 113,620 injured of "industrial accidents" charged to the railways, cannot be taken seriously by any intelligent student and would not be if it related to any other industry.

RAILWAY FATALITIES SINCE 1888.

The next statement gives the results of the Commission's compilations of statistics of railway accidents from the time of its organization down to 1913:

SUMMARY OF PASSENGERS, EMPLOYES AND OTHER PERSONS KILLED IN RAILWAY ACCIDENTS FROM 1888 TO 1913.

Year	Passengers	Employees	Other Persons		Total
			Trespassers	Not Trespassing	
1913.....	336	3,368	5,558	1,702	10,964
1912.....	270	3,283	5,434	1,198	10,185
1911.....	281	3,238	5,284	1,154	9,957
1910.....	324	3,382	4,864	1,112	9,682
1909.....	335a	2,456	5,124	854	8,769
1908.....	406a	3,358	5,560	940	10,264
1907.....	647a	4,353	5,612	1,044	11,656
1906.....	418a	3,807	5,381	949	10,618
1905.....	537	3,261	4,865	940	9,703
1904.....	441	3,367	5,105	868	10,046
1903.....	355	3,233	5,000	879	9,840
1902.....	345	2,516	4,403	871	8,588
1901.....	282	2,675	4,601	897	8,455
1900.....	249	2,550	4,346	660	7,865
1899.....	239	2,210	4,040	635	7,123
1898.....	221	1,958	4,063	617	8,859
1897.....	222	1,693	3,919	603	6,437
1896.....	181	1,861	3,811	595	6,448
1895.....	170	1,811	3,631	524	6,136
1894.....	324	1,823	3,720	580	6,447
1893.....	299	2,627	3,673	647	7,346
1892.....	376	2,554	3,603	614	7,147
1891.....	293	2,660	3,465	611	7,029
1890.....	286	2,451	3,062	536	6,335
1889.....	310	1,972	Not	‡3,541	5,823
1888.....	315	2,070	Given	‡2,897	5,282

‡Includes trespassers.

(a) Passenger totals for these years and presumably prior thereto since 1901, include fatalities to persons traveling on freight trains and under special agreements, such as postal clerks, express messengers, Pullman employes, newsboys, etc., who do not ordinarily figure in passenger statistics.

This table affords proof of a marked decrease in railway accidents in proportion to traffic. Where during the quarter of a century passenger traffic has increased over 220%, fatalities to passengers have increased less than 7%; where the number of employes has increased 162%, fatalities to employes including industrial accidents have increased only 60%; where freight traffic has increased 390%, fatalities to other persons including trespassers increased 151%, and all classes of fatalities increased only 108%.

Printed in black faced headlines the annual accident figures present shocking aggregates, whereas in the truer light of statistical retrospect they show remarkable improvement.

FATALITIES TO PASSENGERS AND PASSENGER TRAFFIC.

In order to arrive at a just idea of the relations of passenger fatalities to the risk, it is necessary to compare the number due to train accidents with the total miles traveled by passengers in successive years as is done in the succeeding statement:

PASSENGERS CARRIED ONE MILE TO ONE KILLED.

Year	Passengers Killed in Train Accidents	Passengers Carried One Mile	Passengers Carried One Mile to One Killed
1913.....	141	34,447,197,000	244,306,362
1912.....	114	33,510,673,000	293,953,272
1911.....	94	33,201,694,699	353,209,518
1910.....	179	32,338,496,329	180,661,991
1909.....	102	29,452,000,000	288,745,100
1908.....	148	29,082,836,944	196,505,648
1907.....	367	27,718,554,030	72,802,600
1906.....	137	25,167,240,831	183,702,488
1905.....	350 ^a	23,800,149,436	68,000,427
1904.....	270	21,923,213,536	81,197,087
1903.....	164	20,915,763,881	127,535,745
1902.....	170	19,689,937,620	115,823,162
1901.....	110	17,353,588,444	157,759,894
1900.....	93	16,038,076,200	172,463,183
1899.....	83	14,591,327,613	175,799,127
1898.....	74	13,379,930,004	180,809,864
1897.....	96	12,256,939,647	127,676,454
1896.....	41	13,049,007,233	318,268,469
1895.....	30	12,188,446,271	406,281,542
1894.....	162	14,289,445,893	88,206,456
1893.....	100	14,229,101,084	142,291,010
1892.....	195	13,362,898,299	68,522,555
1891.....	110	12,844,243,881	116,765,853
1890.....	113	11,847,785,617	104,847,660
1889.....	161	11,553,820,445	71,762,859

(a) In 1905 and prior thereto, these figures probably include fatalities to many persons not covered by other returns for passengers. See Note to preceding table.

In dealing with figures which fluctuate so unaccountably from year to year as those relating to accidents, it is not safe to draw deductions from the comparison of any two years — as the reader will perceive in running the eye down the last column in the above table. Comparisons should be made between periods of five or more years, and even then regard has to be had to the traffic conditions prevailing during those periods. When railway facilities are taxed to their utmost, as was the case in 1892 and 1907, the risk of railway travel is greatest, and vice versa as during the periods of depression following those years.

DECREASING HAZARD OF TRAINMEN.

While every demand for an advance in wages, especially by train crews, is attended by claims of the increasing hazard of the service due to heavier equipment and greater speed, the evidence of accident statistics is steadily to the contrary. In the following table the total of fatalities to trainmen is compared with the number employed since 1889:

SUMMARY SHOWING NUMBER OF TRAINMEN KILLED IN RAILWAY ACCIDENTS, 1889 TO 1913, WITH RATIO TO NUMBER EMPLOYED.

	Trainmen	Trainmen in Yards	Yard Trainmen Switching Crews	All Trainmen	Number of Trainmen for One Killed
1889.....	1,179	.....	.....	1,179	117
1890.....	1,459	.....	.....	1,459	105
1891.....	1,533	.....	.....	1,533	104
1892.....	1,503	.....	.....	1,503	113
1893.....	1,567	.....	.....	1,567	115
1894.....	1,029	.....	.....	1,029	156
1895.....	1,017	.....	.....	1,017	155
1896.....	1,073	.....	.....	1,073	152
1897.....	976	.....	.....	976	165
1898.....	1,141	.....	.....	1,141	150
1899.....	1,155	.....	.....	1,155	155
1900.....	1,396	.....	.....	1,396	137
1901.....	1,537	.....	.....	1,537	136
1902.....	1,507	.....	.....	1,507	135
1903.....	2,021	.....	.....	2,021	123
1904.....	1,181	487	488	2,156	120
1905.....	1,155	386	493	2,034	133
1906.....	1,360	400	575	2,335	124
1907.....	1,507	459	630	2,596	125
1908.....	1,097	362	496	1,955	150
1909.....	789	270	313	1,372	202
1910.....	1,056	325	474	1,855	169
1911.....	905	313	490	1,703	182
1912.....	917	265	481	1,663	192
1913.....	869	304	527	1,700	197

It will be perceived at a glance that the ratio of accidents to number of trainmen employed is very much lower during the past five years than for any period or single year prior to 1909. The average for the last five years was 188 to one killed, whereas the average for the first five years of the table was 111 to one killed. This means a decrease in hazard of almost 77%.

If the fatalities due to carelessness in getting on and off trains had been eliminated, the ratio for 1913 would have been 1 killed to 271 employed.

CAUSES OF ACCIDENTS.

Official investigations during the year brought renewed confirmation of the well-known fact that from 90 to 95 per cent of all the casualties are caused by the failure of the human equation. This is followed up by the *non sequitur* that the attention of Congress should be brought to "the necessity for the development and perfection of some system of automatic train control to be used in connection with existing signal systems."

"Seven of the collisions investigated during the year," says the report, "were caused by the failure of enginemen to obey the indications of block signals. One serious derailment also was due to this cause. . . . Fourteen of the investigated accidents which have occurred on block signaled roads since July 1, 1911, were caused by enginemen running by stop signals or failing to reduce speed as directed by caution signals.

"No adequate reason can be offered for these serious lapses from duty by men who in many cases suffer death as a consequence. . . . The most disastrous accidents of this character occur on roads equipped with modern systems of automatic block signals, where elaborate precautions to prevent accidents (short of guarding against the consequences of signal disobedience) have been taken. The trains involved in these lamentable disasters generally are operated by trusted employes of long experience. But the record abundantly proves that even splendid signal equipment and admirable discipline coupled with long experience and high moral character on the part of employes can not prevent the occasional man failures which produce such fatal results."

Straight as the needle to the pole all experience and investigation point to the *man* as the place to begin "the development and perfection of some system of automatic train control." And yet the Commission insists on more legislation for mechanical contrivances. Men — and railway employes as a class rank high physically, mentally and morally among men — must be developed along lines of exact obedience to simple and safe regulations. But men differ from machines in that they can and do continually meet and overcome exigencies not laid down in any book of rules. The machine cannot rise to the test of the unforeseen where the man can and does. That is why the safest railway operation in the long run must continue to rest upon the development of the human factor.

ACCIDENTS ON BRITISH RAILWAYS.

As affording the best illustration of safe railway operation through the training of employes in precise obedience to regulations with slight dependence on automatic mechanical devices, the next summary covers the casualties on British roads for 1912 and 1911 with totals since 1902:

SUMMARY OF CASUALTIES ON BRITISH RAILWAYS FOR 1911 AND 1912, WITH TOTALS FOR ELEVEN YEARS.

Class	1912		1911	
	Killed	Injured	Killed	Injured
A. Passengers:				
From Accidents to Trains, Rolling Stock, Permanent Way, etc.	20	683	14	468
By Accidents from Other Causes.	100	2,843	98	3,024
Total of Passengers.	120	3,526	112	3,492
B. Servants of Companies or Contractors:*				
From Accidents to Trains, Rolling Stock, Permanent Way, etc.	6	154	5	115
By Accidents from Other Causes.	397	28,046	441	27,733
Total of Servants.	403	28,200	446	27,848
C. Other Persons:				
From Accidents to Trains, etc.		4		8
Persons Passing over Railways at Level Crossings.	69	32	84	38
Trespassers (including suicides)	458	127	462	124
Persons on Business at Stations, etc., and Other Persons not Coming in Above Classifications.	68	731	55	748
Total of Other Persons.	595	894	601	918
Total all Classes 1912.	1,118	32,620	1,159	32,258
" " " 1911.	1,159	32,258		
" " " 1910.	1,121	30,110		
" " " 1909.	1,033	28,383		
" " " 1908.	1,128	28,485		
" " " 1907.	1,211	25,975		
" " " 1906.	1,252	20,444		
" " " 1905.	1,180	18,236		
" " " 1904.	1,158	18,802		
" " " 1903.	1,262	18,557		
" " " 1902.	1,171	17,814		
Total Eleven Years.	12,793	271,684		

* Of contractors' servants in 1912 seven were killed and twenty-nine injured.

In comparing these figures with those for American railways, it should be remembered that our mileage is more than eleven times that of the British Isles and that by reason of our enormous freight traffic, which is 23 times greater than that of British roads, the units of risk are approximately in proportion to the difference in mileage.

The increase in the number of injuries on British roads shown above is a purely paper increase, due to the same changes in the definition of what constitutes a reportable injury that have made a farce of American statistics of injuries.

The returns to the Board of Trade present the following review of average passenger fatalities in train accidents on British railways for thirty-seven years:

AVERAGE NUMBER OF PASSENGERS KILLED AND INJURED IN TRAIN ACCIDENTS ON BRITISH RAILWAYS, 1875 TO 1912.

Year	Number of Passengers Killed and Injured in Train Accidents		Number of Passenger Journeys (exclusive of Journeys by Season-Ticket Holders)* (Millions)
	Killed	Injured	
1875-1884 (Average).....	28	915	598.4
1885-1894 ".....	21	600	798.6
1895-1904 ".....	12	581	1,100.7
1905-1909 ".....	23	447	1,248.4
1910.....	23	1,111	1,306.7
1911.....	14	324	1,326.3
1912.....	20	683	1,294.3

*The number of annual season tickets issued was 779,173 in 1911 and 785,135 in 1912.

RAILWAY ACCIDENTS IN GERMANY.

The statistics of railway accidents in Germany provide an instructive index of how such casualties are treated under government operation. There is a sharp line drawn between accidents for which the railway is responsible and those due to the victim's own fault, as is shown in the following statement for the year 1909, 1910 and 1911:

SUMMARY OF RAILWAY ACCIDENTS IN GERMANY FOR THE YEARS
1909, 1910 AND 1911.

	1909		1910		1911	
	Killed	Injured	Killed	Injured	Killed	Injured
Passengers:						
In Accidents to Trains.....	25	305	2	422	14	324
Other Accidents:						
Without Fault of Their Own.....	3	68	4	72	3	52
As Result of Their Own Carelessness.....	93	194	91	178	98	207
Total Passengers.....	121	567	97	672	115	583
Employees on Duty:						
In Train Accidents.....	13	189	14	202	36	179
In Other Accidents:						
Through Their Own Carelessness in Trains or Cars in Motion.....	79	286	62	297	64	280
In Making up Trains.....	51	259	60	239	55	263
In Coupling Cars.....	87	184	92	175	98	173
While on Tracks in Way of Moving Cars or Trains.....	242	237	240	218	243	235
Through Other Forms of Carelessness.....	61	193	75	219	67	213
Total Employees on Duty.....	533	1,348	543	1,350	563	1,343
Post, Telegraph, Police, and Customs Staff.....	14	50	6	68	13	70
Trespassers, Including Employees Not on Duty..	324	257	280	248	324	271
Suicides.....	402	33	338	27	369	326
Total Trespassers, Etc.....	740	340	624	345	706	667
Total all Classes.....	1,394	2,255	1,264	2,365	1,384	2,593

The contrast between the number of injured on German railways given in this table and those reported for American and British roads illustrates the difference between the governmental and the sentimental attitude to injuries.

The German reports also exclude accidents in railway shops from those chargeable to railway operation.

RAILWAY ACCIDENTS IN EUROPE.

While there is small consolation for your own afflictions in a survey of the similar afflictions of your neighbors, the alleged immunity of European railways from accidents, so often held up as a reproach to American railways, justifies the presentation of the next statement which gives a résumé of the European situation since 1904. This statement is confined strictly to fatalities, as the reports on injuries have no common statistical basis. It should be remembered that American roads operate 56,000 more miles of line than all Europe

represented in this table and that while European passenger traffic is more than twice as great as ours, our freight traffic is nearly three times greater than that of all Europe. In the United States it is the freight traffic that is accountable for the greatest number of casualties, even those resulting in fatalities to passengers.

KILLED IN EUROPEAN RAILWAY ACCIDENTS.

(MILES OF LINE REPRESENTED, 194,682)

Country	Year	Pas- sengers	Em- ployes	Other Persons	Total	Preced- ing Year
United Kingdom.....	1912...	120	403	595	1,118	1,159
Germany.....	1911...	115	563	706	1,384	1,264
Russia (a).....	1909...	206	620	1,860	2,686	2,950
France.....	1910...	671	320	6362	753	692
Austria.....	1911...	16	134	131	281	294
Hungary.....	1911...	54	153	187	394	353
Italy.....	1910-11	24	101	222	347	355
Spain.....	1909...	11	65	242	318	303
Portugal.....	1904...				55	37
Sweden.....	1909...	5	32	59	96	91
Norway.....	1911-12	2	3	9	14	16
Denmark (d).....	1911-12	2	11	18	31	26
Belgium.....	1911...	14	85	65	164	168
Holland.....	1911...	3	11	23	37	61
Switzerland.....	1911...	12	31	56	99	85
Roumania.....	1911-12	14	54	83	151	104
Total Europe.....	1912...	669	2,586	4,618	7,928	7,958
Europe (e).....	1911...	554	2,607	4,465	7,626	.....
".....	1910...	692	2,689	4,461	7,897	.....
".....	1909...	671	2,641	4,322	7,689	.....
".....	1908...	630	2,536	3,580	6,803	.....
".....	1907...	586	2,575	3,400	6,606	.....
".....	1906...	560	2,319	3,553	6,432	.....
".....	1905...	503	2,104	3,414	6,021	.....
".....	1904...	412	1,920	2,665	4,995	.....

(a) Exclusive of local lines and railways of Finland.

(b) In train accidents only.

(c) Excluding suicides, but including passengers killed otherwise than in train accidents.

(d) State railways only.

(e) These figures are those compiled for this Bureau each year since its organization, the details for each country appearing in the report for the following year.

This table demonstrates that there is no exceptional disparity between the records of railway accidents in Europe and the United States. The title "Other persons" covers about the same proportions of trespassers, non-trespassers and suicides there as here. The number of passengers killed in Europe is about double that here, which is accounted for by the larger passenger traffic. The number of employes killed is smaller in Europe, because their statistics exclude casual-

ties in railway shops. Every difference is accounted for by some difference in conditions. But the aggregate figures demonstrate that the toll for transporting billions of units by rail is practically the same the world over.

OVERWORK AND RAILWAY ACCIDENTS.

From an unexpected quarter comes corroboration of the Bureau's contention that there was little or no connection between long hours and railway accidents. In its summary of investigations of accidents by the chief inspector, the Commission (Accident Bulletin No. 48, page 44) says:

"None of the employes involved in any of these accidents was on duty contrary to the provisions of the hours of service law."

This confirms the conclusion from the following summary showing the hours on duty when accidents occur on British railways, covering 7,328 investigations for nine years, that *in no instance was an accident attributed to long hours:*

HOURS WHEN BRITISH ACCIDENTS OCCUR.

Three Months to	Off Duty	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th
Sept. 30, 1912..	0	24	15	12	19	18	18	17	13	27	12	15	11	0	2	1	0	0
Dec. 31, 1913..	0	18	26	14	13	24	19	17	21	16	16	10	7	0	1	0	0	0
Mar. 31, 1913..	1	17	16	45	16	17	18	26	21	16	19	9	2	2	1	0	0	0
June 30, 1913..	0	18	21	21	10	13	13	12	19	18	15	9	1	1	1	0	1	0
Year, 1913.....	1	77	78	92	58	72	68	72	74	77	62	43	21	3	5	1	1	0
" 1912.....	12	83	66	87	89	80	74	65	53	61	65	42	33	12	5	1	0	2
" 1911.....	10	95	88	75	90	85	58	74	74	65	73	57	35	13	5	2	1	1
" 1910.....	13	57	103	83	68	88	72	72	62	64	63	51	32	7	6	1	2	3
" 1909.....	11	61	72	92	78	69	77	68	60	65	54	51	37	8	0	0	1	0
" 1908.....	6	60	103	83	85	77	81	72	70	63	57	53	35	8	8	0	0	0
" 1907.....	1	70	86	78	78	71	64	59	48	68	62	43	35	14	12	5	3	1
" 1906.....	6	52	64	70	86	63	81	68	70	71	61	42	39	7	4	3	0	2
" 1905.....	3	52	74	65	54	71	66	59	48	53	56	41	37	7	3	3	0	1
Nine years.....	63	607	734	725	686	676	641	609	559	587	553	423	304	79	48	16	8	10

It will be perceived that the greatest number of accidents for a particular hour happened during the second hour. From this they declined gradually until the ninth hour. Can any one explain why there should have been more accidents during the ninth hour than during the eighth or tenth?

More than half the accidents happened before the end of the sixth hour.

At great expense of time and money the Commission has compiled

statistics showing that during the year 1913 there were 301,743 cases in which railway employes were on duty for longer periods than those specified in the hours of service law. The figures are impressive until reduced to the percentage of $\frac{1}{18}$ th of 1% on the days worked. Then their impressiveness vanishes and only their expensive futility remains. No accidents were traced to these 301,743 instances of overtime.

OTHER KINDS OF ACCIDENTS.

There is abundant evidence that accidents are not confined to railway operation and service, but attend all industries in which men engage with the elements of speed, weight and large numbers. In the United Kingdom in 1909, fatal street accidents numbered 1,151; in the United States in 1912 there were 691 fatalities due to automobiles reported in 22 cities; in 1913 there were 2,785 fatalities among the 728,355 underground miners in the United States; in Chicago in 1913 there were 802 fatal accidents on the streets, to which automobiles contributed 136; and for 1912-13 the Labor Department of Canada reports 1,028 fatalities distributed as follows:

Agriculture.....	48	Metal Trades.....	92
Fishing and Hunting.....	6	Steam Railways.....	282
Lumbering.....	71	Electric Railways.....	18
Mining.....	121	Navigation.....	83
Railway Construction.....	55	Misc. Skilled Labor.....	70
Building Trades.....	92	Unskilled Labor.....	90
Total Killed.....			1,028
Total Injured.....			3,601

In the United Kingdom the number of fatalities to seamen exceed those in any other occupation. For instance, in January and February, 1914, of 752 fatal industrial accidents reported, 232 were seamen, 231 in mines and quarries, 211 in factories, 74 in railway service and 4 unclassified.

XIII

RAILWAY RECEIVERSHIPS IN 1913

Including the St. Louis and San Francisco, seventeen roads operating 9,020 miles with a gross capitalization of \$477,780,820 were placed in the hands of receivers during the calendar year 1913.

RAILWAY RECEIVERSHIPS IN 1913.

Name of Company	Mileage	Funded Debt	Stock
Arkansas, Louisiana & Gulf.....	61	\$ 1,230,000	\$ 1,231,100
Boyne City, Gaylord & Alpena.....	90	175,000	501,200
Chicago & Eastern Illinois.....	1,275	61,645,000	25,772,600
Greenville & Knoxville.....	24	460,000	260,000
Iowa & Omaha Short Line.....	12	175,000	.....
Kansas City, Ozark & Southern.....	14	.....	300,000
Louisiana & Northwest.....	121	2,180,000	2,300,000
Manistee & Grand Rapids.....	77	265,000	450,000
Missouri, Oklahoma & Gulf.....	247	8,261,000	8,261,000
New Jersey & Pennsylvania.....	25	200,000	400,000
New Orleans, Mobile & Chicago.....	623	12,699,500	8,075,300
*St. Louis & San Francisco.....	6,262	295,499,358	41,985,762
Salt Lake & Mercur.....	13	250,000	300,000
Scott City Northern.....	51	825,000	500,000
Tennessee Railway.....	48	1,129,000	1,000,000
Valdosta, Moultrie & Western.....	42	300,000	100,000
Williamsville, Greenville & St. Louis.....	35	525,000	525,000
Total, 17.....	9,020	\$385,818,858	\$91,961,962

RECEIVERSHIPS SINCE 1876.

	Roads	Miles	Bonds and Stock (000)		Roads	Miles	Bonds and Stock (000)
1876.....	42	6,662	\$467,000	1895.....	38	7,025	\$395,791
1877.....	38	3,637	220,294	1896.....	31	4,089	369,075
1878.....	27	2,320	92,385	1897.....	34	5,441	275,597
1879.....	12	1,102	39,367	1898.....	18	1,537	92,909
1880.....	13	885	140,265	1899.....	18	2,069	138,701
1881.....	5	110	3,742	1900.....	10	1,019	52,285
1882.....	12	912	39,074	1901.....	16	1,165	78,234
1883.....	11	1,990	108,470	1902.....	4	73	1,627
1884.....	37	11,038	714,755	1903.....	5	278	5,835
1885.....	44	8,836	385,460	1904.....	9	229	18,823
1886.....	13	1,799	70,346	1905.....	8	774	36,069
1887.....	9	1,046	90,318	1906.....	10	3,593	176,321
1888.....	22	3,270	186,814	1907.....	6	204	55,042
1889.....	22	3,803	99,664	1908.....	7	317	13,585
1890.....	26	2,963	105,007	1909.....	24	8,009	596,359
1891.....	26	2,159	84,479	1910.....	5	859	78,095
1892.....	36	10,508	357,692	1911.....	7	735	51,427
1893.....	74	29,340	1,781,046	1912.....	5	2,606	210,606
1894.....	17	9,020	477,780	1913.....	13	3,784	182,112
Total 38 years.....					754	145,176	8,262,453

XIV

STATISTICS OF FOREIGN RAILWAYS

In the following pages the Bureau presents the statistics of the principal countries of the world in the most succinct form compatible with including the essentials. The information in these tables is derived from the official statistics of the country to which they relate, and has been translated into American units by the use of the recognized and current equivalents of value and distance.

In the preparation of these tables especially, and in other features of this report, the writer has received invaluable assistance from his associate, Mr. Francis A. Bonner. In fact, this report could not have been made the comprehensive review of American and foreign railways it is believed to be without such assistance.

RAILWAYS OF CANADA.

STATISTICS OF ALL RAILWAYS FOR YEARS ENDING JUNE 30, 1912 AND 1913, COMPARED WITH GOVERNMENT INTERCOLONIAL.

	Intercolonial	All Canadian Roads	
	1913	1912	1913
Miles of Line Operated.....	1,503	26,727	29,304
Second Track.....	64	1,753	1,984
Yard Track and Sidings.....	401	6,149	6,935
All Tracks.....	1,968	34,629	38,223
CAPITAL COST *			
Stock.....		\$770,459,351	\$755,316,516
Debenture Stock.....			163,257,224
Funded Debt.....		818,478,175	613,256,952
Government Railways.....	\$97,138,379	123,036,218	126,930,887
Subsidies.....	374,839	204,932,573	214,690,658
Total Capital Cost.....	\$97,513,218	\$1,916,906,317	\$1,873,452,237
Per Mile of Line.....	66,653	*71,722	*63,932
PASSENGER TRAFFIC			
Passengers Carried.....	3,867,735	41,124,181	46,230,765
Passengers Carried One Mile.....	207,505,697	2,910,251,636	3,265,656,080
Average Journey (miles).....	54	71	71
Average Passengers per Train.....	60	62	62
Mileage of Passenger Trains.....	3,092,590	40,440,393	45,652,365
Mileage of Mixed Trains.....	353,416	6,473,882	7,044,194
Receipts from Passengers.....	\$3,355,293	\$56,543,664	\$64,441,430
Receipts per Passenger Mile (cents)...	1.617	1.943	1.973
FREIGHT TRAFFIC			
Tons Carried.....	5,316,461	89,444,331	106,992,710
Tons Carried One Mile.....	1,424,519,501	19,558,190,527	23,032,951,596
Average Haul (miles).....	268	218	216
Freight Train Mileage.....	4,895,957	60,126,023	67,320,090
Average Tons per Train.....	342	325	342
Receipts from Freight.....	\$8,128,157	\$148,030,269	\$174,684,640
Receipts per Ton Mile (mills).....	5.70	7.57	7.58
Miscellaneous Receipts.....	\$865,846	\$14,829,819	\$17,576,633
Total Receipts.....	\$12,349,296	\$219,403,752	\$256,702,703
EXPENSES OF OPERATION			
Way and Structures.....	\$2,150,119	\$31,514,098	\$35,933,323
Maintenance of Equipment.....	3,141,981	29,811,510	37,289,718
Traffic Expenses.....	246,402	5,293,700	6,143,201
Conducting Transportation.....	6,688,412	78,969,543	96,688,264
General Expenses.....	283,398	5,137,688	5,957,184
Total Expenses.....	\$12,510,312	\$150,726,539	\$182,011,690
Ratio to Earnings.....	101.3%	68.7%	70.9%
Net Receipts.....	†\$161,016	\$68,677,213	\$74,691,013
Per Cent on Capital Cost.....		3.56	3.99
Gross Receipts per Mile.....	\$8,216	\$8,209	\$8,750
Gross Expenses per Mile.....	8,323	5,639	6,204
Net per Mile.....	†107	2,570	2,546
Number of Employees.....		155,901	178,652
Compensation.....		\$87,299,639	\$115,749,825
Proportion of Gross Earnings.....		39.79	45.09
Proportion of Operating Expenses.....		57.92	63.59
Average per Employee per Year.....		\$560	\$648

* Capital for 1913 is the *net capital* cost after deduction of \$157,590,467 stocks and funded debt for elimination of duplications. Additions to railway capital during the year were \$100,483,633. Net capital liability of the Canadian railways, exclusive of government owned roads, in 1913 was \$1,370,452,574 against \$1,378,937,726, estimated, or \$56,314 per mile in 1912, which was far below their capital cost. The Government Intercolonial of course paid no taxes.

† In 1913 the railways paid \$2,444,961 taxes. In Nova Scotia and New Brunswick they are exempt from taxation.

† Deficit.

RAILWAYS OF THE UNITED KINGDOM.

STATISTICS OF MILEAGE, CAPITALIZATION, TRAFFIC AND EMPLOYEES FOR THE YEARS 1910, 1911 AND 1912.

	1910	1911	1912
LENGTH OF RAILWAYS			
Double Track or More (Miles).....	13,072	13,106	13,139
Single Track.....	10,315	10,311	10,302
Total Length of Line.....	23,387	23,417	23,441
All Tracks, Sidings, etc.....	54,311	54,576	54,909
Total Capitalization (Paid Up).....	\$6,421,170,080	\$6,447,969,398	\$6,501,272,332
Capitalization per Mile of Line.....	274,562	275,354	277,346
PASSENGER TRAFFIC			
Passengers Carried.....	1,306,728,583	1,326,316,990	1,294,337,046
Season Ticket Journeys.....	451,597,800	467,503,800	471,081,000
Passengers Carried One Mile.....	13,731,760,000	13,991,802,162	14,123,344,328
Average Journey (Miles).....	7.8	7.8	8.0
Receipts from Passengers.....	\$210,612,890	\$215,168,940	\$215,407,648
Receipts per Passenger Mile (Cents).....	1.534	1.538	1.525
Mail, Parcels, Luggage, etc.....	\$46,318,570	\$48,612,704	\$48,830,769
FREIGHT TRAFFIC			
Minerals, Tons Carried.....	405,087,175	409,812,101	401,563,938
General Merchandise.....	109,341,631	113,765,077	118,715,190
Total Freight, Tons.....	514,428,806	523,577,178	520,279,128
Tons Carried One Mile.....	12,860,721,150	13,089,429,450	13,006,978,200
Average Haul (Miles).....	25	25	25
Receipts from Freight.....	\$299,397,860	\$308,198,217	\$311,917,724
Receipts per Ton Mile (Cents).....	2.328	2.354	2.398
Miscellaneous Receipts.....	\$47,180,560	\$47,582,044	\$49,898,999
Total Receipts*.....	\$603,509,880	\$619,561,905	\$626,055,140
Expenses of Operation.....	372,891,030	382,868,802	395,562,550
Ratio of Expenses to Earnings.....	61.8%	61.8%	63.2%
Net Receipts.....	\$230,618,850	\$236,693,103	\$230,492,590
Per Cent on Paid-Up Capital.....	3.59	3.67	3.55
Gross Receipts per Mile.....	\$25,805	\$26,457	\$26,708
Gross Expenses per Mile.....	15,945	15,900	16,875
Net Receipts per Mile.....	9,860	10,557	9,833
Number of Employees†.....	608,750	608,750	608,750
Total Compensation.....	\$158,932,400	\$164,781,320	\$170,028,613
Proportion of Gross Earnings.....	26.3	26.6	27.2
Proportion of Operating Expenses.....	42.6	43.1	42.9
Average per Employee per Year.....	\$261.10	\$270.70	\$279.31
Taxes Included in Expenses.....	\$24,846,740	\$24,733,914	\$25,013,309

* Includes Rents, Tolls, Steamboats, etc.

† No enumeration of employees has been made since 1910, and none was made between that date and 1907. The last preceding, in 1904, gave a total of 581,664.

RAILWAYS OF GERMANY.

STATISTICS OF MILEAGE, COST OF CONSTRUCTION, TRAFFIC AND
EMPLOYES FOR THE YEARS 1910, 1911 AND 1912.

	1910	1911	1912*
Length of State Railways (miles)....	34,547	34,987	35,481
Length of Private Railways.....	2,193	2,208	2,184
Total.....	36,740	37,195	37,665
Cost of Construction.....	\$4,128,918,723	\$4,244,187,169	\$4,392,651,229
Cost per Mile.....	112,417	114,145	116,662
PASSENGER TRAFFIC			
Passengers Carried.....	1,540,872,110	1,642,903,860	1,743,111,677
Passengers Carried One Mile.....	21,948,393,727	23,460,306,440	24,746,513,960
Average Journey (Miles).....	14.24	14.28	14.20
Receipts from Passengers.....	\$198,737,525	\$211,509,644	\$224,719,558
Receipts per Passenger Mile (cts)...	0.913	0.902	0.910
FREIGHT TRAFFIC			
<i>Fast Freight and Express</i>			
Tons Carried.....	4,708,317	5,166,498	5,547,977
Tons Carried One Mile.....	295,296,195	323,961,907	330,336,173
Average Haul (miles).....	62.71	62.70	59.54
Receipts from Same.....	\$18,959,379	\$20,636,771	\$21,741,790
Receipts per Ton Mile (cents).....	6.42	6.37	6.59
<i>All Freight</i>			
Tons Carried.....	531,527,817	570,740,986	612,385,727
Tons Carried One Mile.....	32,124,223,390	35,397,403,111	37,787,266,225
Average Haul (miles).....	60.43	62.01	61.70
Receipts from Freight.....	\$452,960,105	\$491,520,832	\$519,227,398
Receipts per Ton Mile (cents).....	1.41	1.39	1.37
Miscellaneous Receipts.....	\$70,773,575	\$75,403,985	\$83,473,000
Total Receipts.....	\$772,471,205	\$778,434,461	\$827,419,956
Expenses of Operation.....	490,999,294	512,266,834	558,230,395
Ratio Expenses to Earnings.....	67.96%	65.81%	67.47%
Net Receipts.....	\$231,471,911	\$266,167,627	\$269,189,561
Per Cent on Cost of Construction. . .	5.74	6.41	6.29
Gross Receipts per Mile.....	\$19,783	\$21,031	\$22,082
Gross Expenses per Mile.....	13,445	13,840	14,898
Net Receipts per Mile.....	6,338	7,191	7,184
Number of Employes.....	700,370	716,678	743,944
Total Compensation.....	\$269,571,466	\$281,176,191	\$300,723,513
Proportion of Gross Earnings.....	37.3	36.1	36.3
Proportion of Operating Expenses. . .	54.8	54.9	53.9
Average per Employee per Year.....	\$384.89	\$392.33	\$404.23

*The 1912 report reached Chicago too late for compilation elsewhere in this year's "Statistics."

RAILWAYS OF FRANCE.

STATISTICS OF MILEAGE, COST OF CONSTRUCTION, TRAFFIC AND EMPLOYES FOR THE YEARS 1909, 1910 AND 1911.

	1909	1910	1911
Length of State Railways (miles)....	5,502	5,533	5,559
Length of Private Railways (miles)...	19,474	19,567	19,635
Total.....	24,976	25,100	25,194
Cost of Construction.....	\$3,593,565,914	\$3,642,672,038	\$3,720,480,021
Cost per Mile.....	144,800	146,000	148,625
PASSENGER TRAFFIC			
Passengers Carried.....	491,936,930	508,558,187	511,096,490
Passengers Carried One Mile.....	10,132,466,165	10,482,294,329	10,899,560,427
Average Journey (miles).....	20.58	20.58	21.33
Receipts from Passengers (excludes taxes).....	\$152,566,798	\$156,106,670	\$162,383,599
Receipts per Passenger Mile (cents)...	1.09	1.08	1.08
FREIGHT TRAFFIC			
Tons Carried.....	165,027,920	173,241,483	184,635,276
Tons Carried One Mile.....	13,225,376,441	13,630,172,993	14,438,559,741
Average Haul (miles).....	80.17	78.68	78.18
Receipts from Same.....	\$184,394,566	\$191,066,642	\$198,292,706
Receipts per Ton Mile (cents).....	1.32	1.33	1.30
Other Receipts.....	\$5,284,216	\$5,470,200	\$5,980,128
Total Receipts.....	\$342,245,580	\$352,643,512	\$366,656,433
Expenses of Operation.....	200,834,711	212,068,769	229,361,949
Ratio Expenses to Earnings.....	58.7%	60.1%	62.6%
Net Receipts.....	\$141,410,869	\$140,574,743	\$137,294,484
Total Net Receipts.....	141,915,519	141,110,012	137,548,035
Per Cent on Cost of Construction....	3.95	3.87	3.69
Gross Receipts per Mile.....	\$13,689	\$14,036	\$14,540
Gross Expenses per Mile.....	8,033	8,441	9,096
Net per Mile.....	5,656	5,595	5,444
Number of Employees*.....	453,099	456,657	462,590

*No data as to compensation excepting in "Traction et materiel" where average per employee in 1911 was \$208.63 per year.

SWITZERLAND AND ITALY.

STATISTICS OF MILEAGE, CAPITALIZATION, TRAFFIC AND EMPLOYES
FOR THE YEARS 1910 AND 1911.

	Switzerland (all Rys.)		Italy (State Roads only)	
	1910	1911	1910	1911
Length of State Railways (miles).....	1,637	1,665	8,258	8,270
Length of Private Railways...	1,247	1,279	.....	.....
Total Length.....	2,884	*2,944	8,258	†8,270
Cost of Construction.....	\$341,208,393	\$351,628,701	.....	†\$1,131,300,000
Cost per Mile.....	119,411	120,950	.....	126,886
PASSENGER TRAFFIC				
Passengers Carried.....	110,068,465	117,325,594	*82,407,600	*86,454,345
Passengers Carried One Mile..	1,434,017,811	1,511,424,050	.....	.....
Average Journey (miles).....	13.03	12.88	.....	.....
Receipts from Passengers.....	\$18,542,349	\$19,647,037	\$35,322,431	\$37,444,981
Receipts per Passenger Mile (cents).....	1.29	1.30	.....	.....
FREIGHT TRAFFIC				
Tons Carried.....	17,023,916	18,202,898	33,807,404	35,548,954
Tons Carried One Mile.....	774,272,488	828,662,905	.....	.....
Average Haul.....	45.48	45.53	.....	.....
Receipts from Freight.....	\$22,578,069	\$24,216,854	\$56,983,533	\$60,539,138
Receipts per Ton Mile (cents)..	2.91	2.92	.....	.....
Other Receipts.....	\$1,810,053	\$1,897,393	\$10,991,654	\$11,391,535
Total Receipts.....	\$42,930,471	\$45,761,284	\$103,297,618	\$109,375,654
Expense of Operation.....	27,130,091	29,120,897	85,641,748	92,296,415
Ratio Expense to Earnings....	63.20%	63.64%	82.91%	84.39%
Net Receipts.....	\$15,800,380	\$16,640,387	\$17,655,870	\$17,079,239
Percentage on Cost of Con- struction.....	4.63	4.73	.....	1.51
Gross Receipts per Mile.....	\$14,847	\$15,568	\$12,496	\$13,212
Gross Expenses per Mile.....	9,382	9,907	10,360	11,149
Net Receipts per Mile.....	5,465	5,661	2,136	2,063
Number of Employes.....	41,179	41,730	149,329	149,040
Total Compensation.....	.....	.....	\$47,095,678	\$51,479,782
Proportion of Gross Earnings..	.....	.....	45.60	47.07
Proportion of Operating Ex- penses.....	.....	.....	54.99	55.78
Average per Employe per Year	.....	.....	\$315.36	\$345.47

*Includes 685 miles narrow gauge and 63 miles cog railways.

†In addition there were in 1911, 1,772 miles of private lines.

‡Some additional mileage in foreign territory included. Figure is for 1908-09, the latest for which capital is reported.

§Italian railways compile no passenger-mile or ton-mile statistics.

AUSTRIA AND HUNGARY.

STATISTICS OF MILEAGE, CAPITALIZATION, TRAFFIC AND EMPLOYES
FOR THE YEARS 1910 AND 1911.

	Austria (all Rys.)'		Hungary (all Rys.)	
	1910	1911	1910	1911
Length of State Railways (miles).....	11,604	11,634	10,758	10,925
Length of Private Railways...	2,434	2,470	2,042	2,087
Total.....	14,038	14,104	12,800	13,012
Cost of Construction.....	\$1,654,207,119	\$1,702,243,423	\$868,700,000	\$901,789,366
Cost per Mile.....	117,837	120,692	67,880	69,211
PASSENGER TRAFFIC				
Passengers Carried.....	254,618,531	276,642,501	140,002,000	153,800,002
Passengers Carried One Mile..	4,663,578,000	4,932,038,000	2,730,737,300	2,958,832,200
Average Journey (miles).....	18.31	17.83	19.50	19.24
Receipts from Passengers.....	\$49,247,800	\$51,724,400	\$25,384,338	\$27,522,943
Receipts per Passenger Mile (cents).....	1.06	1.05	0.93	0.93
FREIGHT TRAFFIC				
Tons Carried.....	137,599,886	146,127,228	68,806,000	78,760,000
Tons Carried One Mile.....	9,376,260,000	10,127,018,000	5,019,030,820	5,579,502,140
Average Haul (miles).....	68.14	69.30	72.97	70.87
Receipts from Freight.....	\$137,390,400	\$147,499,800	\$66,448,193	\$74,588,087
Receipts per Ton Mile (cents)	1.47	1.45	*1.32	*1.33
Miscellaneous Receipts.....	\$12,687,500	\$13,215,300	\$4,323,697	\$4,787,958
Total Receipts.....	\$199,325,700	\$212,439,500	\$96,156,228	\$106,898,988
Expenses of Operation.....	153,122,900	158,522,700	62,283,242	67,321,702
Ratio Expenses to Earnings..	76.82%	74.62%	64.77%	62.98%
Net Receipts.....	\$46,202,800	\$53,916,800	\$33,872,986	\$39,577,286
Per Cent on Cost of Construction.....	2.75	3.17	3.90	4.39
Gross Receipts per Mile.....	\$14,199	\$15,062	\$7,421	\$8,091
Gross Expenses per Mile.....	10,908	11,239	4,807	5,095
Net Receipts per Mile.....	3,291	3,823	2,614	2,996
Number of Employees.....	†277,619	†276,943	.....	†136,334
Total Compensation.....	\$81,601,618	\$89,051,382	.....	\$39,505,486
Proportion of Gross Earnings.	40.94%	41.92%	.....	36.96
Proportion of Operating Expenses.....	53.29%	56.18%	.....	58.68
Average per Employee per Year	\$293.93	\$321.55	.....	\$298.77

*Fast freight paid 6.21 cents per ton mile in 1910 and 6.43 cents in 1911.

†Includes laborers.

BELGIUM AND HOLLAND.

STATISTICS OF MILEAGE, CAPITALIZATION, TRAFFIC AND EMPLOYEES
FOR YEARS 1910 AND 1911.

	Belgium (State Rys.)		Holland (all Rys.)	
	1910	1911	1910	1911
Length of State Rys. (miles) . .	2,684	2,684	1,061	1,114
Length of Private Railways. . .	243	242	917	866
Total.	2,927	2,926	1,978	1,980
Cost of Construction.	*\$504,220,661	*\$512,414,202	.....	§\$136,612,000
Cost per Mile.	187,861	190,914	.....	82,795
PASSENGER TRAFFIC				
Passengers Carried.	175,312,540	180,840,189	†47,711,000	†46,426,000
Passengers Carried One Mile. .	2,698,059,991	2,685,476,807	835,408,420	736,625,720
Average Journey (miles). . . .	15.39	14.85	17.92	15.87
Receipts from Passengers. . . .	\$19,900,227	\$18,956,440	\$12,436,674	\$12,998,268
Receipts per Passenger Mile (cents).	0.74	0.71	1.49	1.76
FREIGHT TRAFFIC				
Tons Carried.	58,086,805	61,408,969	†16,702,400	†18,579,800
Tons Carried One Mile.	2,888,075,945	3,167,474,621	†862,785,180	†963,414,900
Average Haul (miles).	49.72	51.58	†55.19	†55.30
Receipts for Same.	\$34,228,411	\$36,288,811	\$12,155,274	\$13,404,288
Receipts per Ton Mile (cents). .	1.18	1.14	†1.38	†1.36
Miscellaneous Receipts.	\$5,604,260	\$5,332,189	.....	.....
Total Receipts.	\$59,732,898	\$60,577,440	\$24,591,948	\$26,402,556
Expenses of Operation.	39,192,969	40,654,493	20,984,830	.....
Ratio Expenses to Earnings. . .	65.61%	67.11%	85.33%	.....
Net Receipts.	\$20,539,929	\$19,922,947	3,607,118	.....
Per Cent on Cost of Construc- tion.	4.07	3.88	2.64	.....
Gross Receipts per Mile.	\$22,233	\$22,546	\$12,433	.....
Gross Expenses per Mile.	14,588	15,131	10,609	.....
Net Receipts per Mile.	7,645	7,415	1,824	.....
Number of Employees.	#69,168	#70,364	.....	.....
Total Compensation.	\$17,034,789	\$17,991,907	.....	.....
Proportion of Gross Earnings. .	28.52	29.69	.....	.....
Proportion of Operating Ex- penses.	43.47	44.26	.....	.....
Average for Employee per Year. .	\$246.27	\$255.69	.....	.....

* Following figures apply to state mileage only.

§ Figure for 1897, last published, based on 1,650 miles.

† Traffic figures include short mileages in Germany, Belgium, etc., bringing total miles 1910 up to 2,288; 1911, 2,322. Vehicles, baggage and live stock not included.

‡ Omitting one company, 42 miles, not reporting.

* Includes laborers.

DENMARK, NORWAY AND SWEDEN.

STATISTICS OF MILEAGE, CAPITALIZATION, TRAFFIC AND EMPLOYEES
IN YEARS SPECIFIED.

	Denmark, State Railways		Norway all Railways	Sweden all Railways
	1912	1913*	1912	1909
Length of State Railways (miles).....	1,207	1,210	1,631	2,710
Length of Private Railways....	1,042	1,105	281	5,724
Total.....	2,249	2,315	\$1,913	8,434
†Cost of Construction.....	†\$72,533,990	†\$75,258,132	\$82,791,431	\$278,769,309
Cost per Mile.....	60,094	62,114	43,282	*\$32,964
PASSENGER TRAFFIC				
Passengers Carried.....	23,213,833	22,803,161	15,949,974	53,785,850
Passengers Carried One Mile...	504,604,335	490,531,664	250,781,391	907,755,454
Average Journey (miles).....	21.76	21.51	15.75	16.86
Receipts from Passenger Traffic.....	\$5,815,003	\$6,444,773	\$3,277,000	\$11,492,791
Receipts per Passenger Mile (cents).....	1.13	1.30	1.21	1.23
Baggage Carried (tons).....	11,166	10,339	.....	.....
Baggage Carried One Mile (tons).....	588,301	553,082	.....	.....
Average Haul (miles).....	52.69	53.49	.....	.....
Receipts from Same.....	\$183,305	\$198,383	.....	.....
Receipt per Ton Mile (cents)...	31.16	35.86	.....	.....
FREIGHT TRAFFIC				
Tons Carried.....	5,456,963	6,029,150	6,489,935	31,098,790
Tons Carried One Mile.....	296,967,626	322,108,097	224,745,339	1,341,800,466
Average Haul (miles).....	54.42	53.43	34.65	43.15
Receipts from Freight.....	\$6,325,418	\$7,398,681	\$3,960,930	\$20,500,900
Receipts per Ton Mile (cents)...	2.13	2.29	1.60	1.65
Other Receipts.....	\$836,879	\$683,584	\$125,709	\$1,379,711
Total.....	\$13,160,605	\$14,725,421	\$7,363,639	\$33,373,402
Expense of Operation.....	11,414,046	11,557,606	5,558,863	26,596,299
Ratio Expenses to Earnings...	\$6.72%	78.49%	75.5%	79.69%
Net Receipts.....	\$1,746,559	\$3,167,815	\$1,804,776	\$6,777,103
Per Cent on Cost of Construc- tion.....	2.49	4.29	2.18	2.47
Gross Revenue per Mile.....	\$10,903	\$7,544	\$3,847	\$3,993
Gross Expense per Mile.....	9,456	5,921	2,904	3,182
Net Revenue per Mile.....	1,447	1,623	943	\$11
Number Employees.....	13,254	13,209	6,589	.....
Total Compensation.....	\$4,432,329	\$4,518,275	.....	.....
Proportion of Gross Earnings..	†33.78	30.7	.....	.....
Proportion of Gross Expenses..	38.83	39.1	.....	.....
Average per Employee per Year.	\$334.41	\$342.06	.....	.....

* The 1913 report reached Chicago too late for compilation elsewhere in this year's "Statistics."

† Figures hereafter apply to state railways only.

‡ Proportion is smaller than it should be because large items of temporary labor are not segregated in annual report. For the same reason average pay is too high, applying only to permanent employees.

§ Only 1,174 miles standard gauge.

* State railways alone were capitalized at \$51,386 per mile in 1911.

RUSSIA AND BULGARIA.

STATISTICS OF MILEAGE, CAPITALIZATION, TRAFFIC AND EMPLOYES
FOR SPECIFIED YEARS.

	Russia, all Rys.		Bulgaria, State Rys.	
	1908	1909	1910	1911
Length of State Railways (miles).....	28,017	28,278	1,174	1,197
Length of Private Railways (miles).....	13,222	13,222	.....	.....
Total.....	41,239	41,500	1,174	1,197
Cost of Construction.....	\$3,378,839,810	\$3,478,263,650	\$54,088,408	\$56,559,713
Cost per Mile.....	81,933	83,813	46,019	47,200
PASSENGER TRAFFIC				
Passenger Carried.....	162,117,000	175,054,000	3,069,917	3,489,372
Passengers Carried One Mile..	12,629,152,800	13,258,401,420	130,023,390	145,138,874
Average Journey (miles).....	77.93	75.73	42.35	41.59
Receipts from Same.....	\$70,459,152	\$79,430,390	\$1,812,391	\$2,119,540
Receipts per Passenger Mile (cents).....*	.66	.69	1.39	1.46
FREIGHT TRAFFIC				
Tons Carried.....	229,558,212	247,664,952	1,489,064	2,037,448
Tons Carried One Mile.....	36,696,562,944	39,906,552,540	121,553,551	167,622,189
Average Haul (miles).....	158	160	81.63	82.27
Receipts from Same.....	\$426,575,015	\$465,053,240	\$2,329,667	\$2,958,378
Receipts per Ton Mile (cents)..	1.16	1.17	1.91	1.76
Other Receipts.....	.....	.....	\$226,102	\$263,279
Total Receipts.....	*\$426,777,211	*\$465,082,015	\$4,368,160	\$5,341,197
Expenses of Operation.....	344,497,565	340,314,051	2,970,793	3,363,418
Ratio Expenses to Earnings...	81%	73%	68%	63%
Net Receipts.....	†\$82,096,769	\$124,767,964	\$1,397,367	\$1,977,779
Per Cent on Cost of Construc- tion.....	2.43	3.59	2.71	3.56
Gross Receipts per Mile.....	\$10,790	\$11,698	\$4,017	\$4,511
Gross Expenses per Mile.....	8,709	8,559	2,732	2,840
Net Receipts per Mile.....	2,081	3,139	1,285	1,671
Number of Employees.....	844,100	797,926	†3,955	†4,160
Total Compensation.....	\$165,568,840	\$162,487,101	\$1,048,136	\$1,120,124
Proportion of Gross Earnings.	38.79	34.94	23.99	20.97
Proportion of Operating Ex- penses.....	48.06	47.74	35.28	33.30
Average per Employee per Year	\$196.14	\$203.64	\$264.98	\$269.23

*After deduction of tax on passenger, baggage and freight traffic.

†Russian figures show discrepancy for 1908.

‡Excludes laborers, 3,100 in 1910 and 3,669 in 1911.

RAILWAYS OF JAPAN.

STATISTICS OF MILEAGE, CAPITALIZATION, TRAFFIC AND EMPLOYES ON THE IMPERIAL GOVERNMENT RAILWAYS SINCE NATIONALIZA- TION.

	1907-08	1908-09	1910-11	1911-12
Length of State Railways (miles)*.....	3,982	4,513	4,767	4,950
Cost of Construction.....	\$190,173,728	\$376,943,494	\$411,598,253	\$436,114,999
Cost per Mile.....	47,759	83,524	86,343	88,104
PASSENGER TRAFFIC				
Passengers Carried†.....	101,115,739	123,227,543	138,629,706	151,077,779
Passengers Carried One Mile..	2,353,270,765	2,743,203,558	3,038,736,966	3,382,586,411
Average Journey (miles).....	23.3	22.3	21.9	22.4
Receipts from Passengers.....	\$17,556,883	\$19,543,981	\$21,072,498	\$23,433,157
Receipts per Passenger Mile (cents).....	0.75	0.71	0.69	0.69
FREIGHT TRAFFIC				
Tons Carried.....	18,312,223	23,524,559	25,481,868	29,337,054
Tons Carried One Mile.....	1,441,125,013	1,829,429,158	2,126,834,473	2,347,871,475
Average Haul (miles).....	78.7	77.8	83.5	80.0
Receipts from Freight.....	\$14,590,721	\$17,784,792	\$20,379,157	\$22,787,091
Receipts per Ton Mile (cents)..	0.87	0.83	0.82	0.83
Terminal Charges per Ton (cents).....	11.2	10.9	11.3	11.3
Total Rate per Ton Mile (cents).....	1.01	0.97	0.95	0.97
Other Receipts.....	\$2,739,976	\$2,582,018	\$3,216,64	\$3,869,661
Total Receipts.....	\$34,887,580	\$39,910,791	\$44,668,296	\$50,089,909
Expenses of Operation.....	17,875,971	21,429,818	21,624,686	22,884,128
Ratio Expenses to Earnings...	51%	54%	48%	46%
Net Receipts.....	\$17,011,609	\$18,480,973	\$23,043,610	\$27,205,781
Per Cent on Cost of Construc- tion.....	8.94	4.90	5.59	6.24
Gross Receipts per Mile.....	\$8,761	\$8,843	\$9,368	\$10,119
Gross Expenses per Mile.....	4,489	4,748	4,537	4,623
Net Receipts per Mile.....	4,272	4,095	4,831	5,496
Number of Employees.....	88,266	89,868	95,627	103,418
Total Compensation.....	\$8,812,806	\$9,238,152	\$10,662,384	\$11,631,642
Proportion of Gross Earnings	25.26	23.15	23.87	23.22
Proportion of Operating Ex- penses.....	49.30	43.11	49.31	50.83
Average per Employee per Year	\$99.84	\$102.78	\$111.48	\$112.50

*In addition there were operated in 1911-12, 522 miles of private and light railways against 490 miles the year before.

†In 1911-12, 95% of the passengers were third class and only .29 per cent first class.

NEW SOUTH WALES AND NEW ZEALAND STATE RAILWAYS.

STATISTICS OF MILEAGE, CAPITALIZATION, TRAFFIC AND EMPLOYEES FOR THE YEARS 1911-12 AND 1912-13.

	New South Wales		New Zealand	
	1911-1912	1912-1913	1911-1912	1912-1913
Length (miles).....	3,832	3,930	†2,801	†2,840
Cost of Construction.....	\$260,430,275	\$280,572,110	\$148,564,653	\$153,946,641
Cost per Mile.....	67,970	71,391	52,908	53,828
PASSENGER TRAFFIC				
Passengers Carried.....	70,706,728	79,490,012	11,891,134	13,123,879
Passengers Carried One Mile..	1,091,087,609	1,192,584,271	.....	.....
Average Journey (miles).....	15.43	15.00	.....	.....
Receipts from Passengers.....	\$11,432,766	\$12,513,941	\$7,414,322	\$8,167,389
Receipts per Passenger Mile (cents).....	1.04	1.05	.....	.....
FREIGHT TRAFFIC				
Tons Carried.....	10,910,553	11,666,250	5,887,908	6,246,128
Tons Carried One Mile.....	\$62,016,104	\$61,939,969	.....	.....
Average Haul (miles).....	81.08	75.60	.....	.....
Receipts from Freight.....	\$18,082,488	\$18,032,207	\$10,490,277	\$11,171,391
Receipts per Ton Mile (cents)	*1.78	*1.76	.....	.....
Terminal Receipts per Ton (cents).....	23.81	23.01	.....	.....
Other Receipts.....	\$2,075,499	\$2,297,786	.....	.....
Total Receipts.....	\$31,590,753	\$32,843,934	\$17,904,599	\$19,338,780
Expenses of Operation.....	20,291,314	22,604,313	12,008,914	13,176,316
Ratio Expenses to Earnings...	64.23%	68.82%	67.07%	68.13%
Net Receipts.....	\$11,299,439	\$10,239,621	\$5,895,685	\$6,162,464
Per Cent on Cost of Construction.....	4.41	3.76	3.98	4.04
Gross Receipts per Mile.....	\$8,311	\$8,482	\$6,399	\$6,818
Gross Expenses per Mile.....	5,338	5,835	4,390	4,646
Net Receipts per Mile.....	2,973	2,647	2,109	2,172
Number of Employees.....	28,961	31,746	13,523	14,213
Total Compensation.....	\$13,727,827	\$16,027,840	.....	\$8,991,286
Proportion of Gross Earnings.	43.46	48.80	.....	46.5
Proportion of Operating Expenses.....	67.65	70.90	.....	68.2
Average per Employee per Year	\$474.01	\$504.88	.....	\$632.61

* Omits terminal receipts.

† Entirely 3½ foot gauge.

SOUTH AUSTRALIA, WESTERN AUSTRALIA AND VICTORIA STATE RAILWAYS.

STATISTICS OF MILEAGE, CAPITALIZATION, TRAFFIC AND EMPLOYES FOR LATEST FISCAL YEARS.

	South Australia		Western Australia	Victoria
	1911-1912	1912-1913	1912-1913	1912-1913
Length (miles).....	†1,460	†1,534	*2,854	\$3,639
Cost of Construction.....	\$64,433,311	\$68,999,597	72,574,737	\$231,657,796
Cost per Mile.....	44,119	44,970	25,429	63,519
PASSENGER TRAFFIC				
Passengers Carried.....	18,353,054	19,382,330	17,920,096	111,513,908
Passengers Carried One Mile..	213,299,008	228,706,514		
Average Journey.....	11.62	11.80		
Receipts from Passengers....	\$3,395,722	\$3,567,918	\$3,144,820	\$13,451,734
Receipts per Passenger Mile (cents).....	1.30	1.28		
FREIGHT TRAFFIC				
Tons Carried.....	2,781,720	3,016,039	3,282,361	5,150,404
Tons Carried One Mile.....	334,124,559	335,404,400		
Average Haul.....	120.11	117.84		
Receipts from Freight.....	\$6,549,720	7,016,806	\$6,321,675	\$11,457,347
Receipts per Ton Mile.....	1.94	1.94		
Other Receipts.....	\$228,282	\$230,759	\$450,716	\$441,422
Total Receipts.....	\$10,173,724	\$10,815,484	\$9,917,211	\$25,350,503
Expenses of Operation.....	6,297,187	6,782,806	7,331,869	16,932,781
Ratio Expenses to Earnings...	61.89%	62.71%	73.93%	66.79%
Net Receipts.....	\$3,876,537	\$4,032,678	\$2,585,342	\$8,417,722
Per Cent on Cost of Construction.....	6.02	5.84	3.56	3.63
Gross Receipts per Mile.....	\$6,964	\$7,052	\$3,475	\$6,964
Gross Expenses per Mile.....	4,312	4,419	2,569	4,651
Net Receipts per Mile.....	2,652	2,633	906	2,313
Number of Employees.....	8,569	8,754	7,749	
Total Compensation.....	\$4,085,991	\$4,441,684	\$6,018,381	
Proportion of Gross Earnings	40.16	41.07	60.69	
Proportion of Operating Expenses.....	64.88	65.48	82.08	
Average per Employee per Year	\$476.83	\$507.39	\$776.66	

*Entirely 3½ foot gauge.

†835 miles 3½ foot gauge, balance 5 ft. 3 in.

‡122 miles 2½ foot gauge, balance 5 ft. 3 in.

XV

GROWTH OF RAILWAYS

In three-quarters of a century American railways from small beginnings in Pennsylvania in 1827, Maryland in 1828, South Carolina in 1830, and New York and Massachusetts in 1831, show the following remarkable growth by decades:

PROGRESS OF RAILWAYS IN THE UNITED STATES SINCE 1835.

States	1835	1840	1850	1860	1870	1880	1890	1900	1910	1911
Alabama.....	46	46	75	743	1,429	1,851	3,148	4,219	5,022	5,259
Arizona.....						384	1,061	1,511	2,097	2,123
Arkansas.....				38	256	896	2,113	3,341	5,135	5,288
California.....				23	925	2,220	4,148	5,744	7,655	7,885
Colorado.....					157	1,531	4,154	4,587	5,519	5,587
Connecticut.....		102	402	601	742	954	1,007	1,023	1,000	1,001
Delaware.....	16	39	39	127	224	280	328	346	335	335
Florida.....			21	402	446	530	2,390	3,272	4,370	4,556
Georgia.....		185	643	1,420	1,845	2,535	4,105	5,639	7,020	7,174
Idaho.....						220	941	1,261	2,168	2,458
Illinois.....			111	2,799	4,823	7,955	9,843	10,997	11,876	11,980
Indiana.....			228	2,163	3,177	5,454	5,891	6,469	7,420	7,447
Iowa.....				655	2,683	5,235	8,347	9,180	9,733	9,856
Kansas.....					1,501	3,439	8,806	8,719	9,007	9,090
Kentucky.....	15	28	78	534	1,017	1,598	2,694	3,059	3,518	3,607
Louisiana.....	40	40	80	335	479	633	1,658	2,824	5,469	5,657
Maine.....		11	245	472	786	1,013	1,313	1,915	2,248	2,278
Maryland & D. C.	117	213	259	386	671	1,012	1,168	1,407	1,413	1,434
Massachusetts...	113	301	1,035	1,264	1,480	1,893	2,094	2,118	2,109	2,115
Michigan.....		50	342	779	1,638	3,931	6,789	8,193	8,985	8,943
Minnesota.....					1,072	3,108	5,466	6,942	8,669	8,932
Mississippi.....			75	862	990	1,183	2,292	2,919	4,413	4,459
Missouri.....				817	2,000	4,011	5,897	6,867	8,078	8,108
Montana.....						48	2,181	3,010	4,207	4,326
Nebraska.....					1,812	2,000	5,274	5,684	6,067	6,066
Nevada.....					593	769	925	909	2,277	2,299
New Hampshire...		53	467	661	736	1,015	1,133	1,239	1,246	1,246
New Jersey.....	99	186	206	560	1,125	1,701	2,034	2,237	2,255	2,267
New Mexico.....						643	1,284	1,752	2,999	3,038
New York.....	104	374	1,361	2,682	3,928	6,019	7,462	8,121	8,416	8,475
North Carolina...		53	154	937	1,178	1,499	2,904	3,808	4,734	5,072
North Dakota...					35	635	1,940	2,731	4,201	4,450
Ohio.....		30	575	2,946	3,538	5,912	7,719	8,774	9,128	9,128
Oklahoma.....						275	1,213	2,150	5,978	6,076
Oregon.....					159	582	1,269	1,723	2,279	2,657
Pennsylvania....	318	754	1,240	2,598	4,656	6,243	8,307	10,277	11,084	11,341
Rhode Island.....		50	68	108	136	210	212	212	212	212
South Carolina...	137	137	289	973	1,139	1,429	2,096	2,795	3,410	3,509
South Dakota.....					30	630	2,485	2,850	3,948	4,193
Tennessee.....				1,253	1,492	1,824	2,710	3,124	3,809	3,881
Texas.....				307	711	3,293	7,911	9,873	14,243	14,777
Utah.....					257	770	1,090	1,547	1,986	1,999
Vermont.....			290	554	614	912	913	1,012	1,081	1,072
Virginia.....	93	147	384	1,379	1,486	1,826	3,142	3,729	4,443	4,581
Washington.....						274	1,699	2,890	4,858	5,288
West Virginia....					387	694	1,306	2,198	3,526	3,575
Wisconsin.....			20	905	1,525	3,130	5,468	6,496	7,328	7,399
Wyoming.....						472	941	1,228	1,600	1,644
Dist. of Columbia.									36	36
Total.....	1,098	2,818	9,021	30,635	52,922	93,671	159,271	192,940	238,609	244,180*

* Includes 1,294 miles unofficial, not reporting.

GROWTH OF RAILWAYS OF THE WORLD.

In the following table is given the mileage of the principal countries in the world from the earliest date available to the latest:

Country	Miles of Road Completed									
	Opened	1840	1850	1860	1870	1880	1889	1899	1910	1913†
Great Britain..	1825	1,857	6,621	10,433	15,537	17,933	19,943	21,666	23,280	23,441
United States..	1827	2,818	9,021	30,626	52,922	93,296	160,544	.....	236,422	251,500
Canada.....	1836	16	66	2,065	2,617	7,194	12,585	17,250	24,731	29,304
France.....	1828	.....	1,714	5,700	11,142	16,275	21,899	26,229	29,364	31,213
Germany.....	1835	341	3,637	6,979	11,729	20,693	24,845	31,386	36,235	37,665
Belgium.....	1835	207	554	1,074	1,799	2,399	2,776	2,883	2,888	5,381
Austria (proper)	1837	.....	817	1,813	3,790	7,083	9,345	11,921	13,591	14,104
Russia†.....	1838	.....	310	988	7,098	14,026	17,534	26,889	35,347	41,500
Italy.....	1839	13	265	1,117	3,825	5,340	7,830	9,770	10,425	10,705
Holland.....	1839	10	110	208	874	1,143	1,632	1,966	2,235	2,250
Switzerland....	1844	.....	15	653	885	1,596	1,869	2,342	2,791	2,971
Hungary.....	1846	.....	137	1,004	2,157	4,421	6,751	10,619	12,177	13,012
Denmark.....	1847	.....	20	69	470	975	1,217	1,764	2,121	2,343
Spain.....	1848	.....	17	1,190	3,400	4,550	5,951	8,252	8,961	9,381
Chili.....	1851	.....	.....	120	452	1,100	1,801	2,791	3,451	3,573
Brazil.....	1851	.....	.....	134	504	2,174	5,546	9,195	11,863	13,532
Norway.....	1854	.....	.....	42	692	970	970	1,231	1,608	1,921
Sweden.....	1856	.....	.....	375	1,089	3,654	4,899	6,663	8,321	8,758
Argentine Re- public.....	1857	.....	.....	.....	637	1,536	4,506	10,013	14,111	19,620
Turkey in Europe.....	.....	.....	.....	41	392	727	1,024	1,900	1,967	1,069
Peru.....	.....	.....	.....	47	247	1,179	993	1,035	1,470	1,656
Portugal.....	.....	.....	.....	42	444	710	1,118	1,475	1,689	1,854
Greece.....	1869	.....	.....	.....	6	7	416	604	845	988
Uruguay.....	1869	.....	.....	.....	61	268	399	997	1,371	1,639
Mexico.....	1868	.....	.....	.....	215	655	5,012	8,503	14,845	15,359
Roumania.....	.....	.....	.....	.....	152	859	1,537	1,920	1,976	2,241
Australia*.....	.....	.....	.....	.....	.....	789	4,850	11,111	17,956	19,023
Japan.....	1874	.....	.....	.....	.....	75	542	3,632	5,130	5,355
British India...	1853	.....	.....	838	4,771	9,162	15,887	23,523	30,809	33,484
China.....	1883	.....	.....	.....	.....	.....	124	401	4,997	6,123
Africa.....	.....	.....	.....	.....	.....	583	2,873	5,353	19,207	25,159

* Including New Zealand.

† Or latest figures

‡ Includes Asiatic Railways.

XVI

COST OF RAILWAY REGULATION

The cost of regulating American railways continues to increase in a faster ratio than anything else pertaining to them, not even excepting taxes. The record of the growth of this tax on the general revenues is given in the following table of yearly expenditures:

1888	Five Commissioners.....	\$ 97,867
1889	" "	149,453
1890	" "	180,440
1891	" "	214,844
1892	" "	221,745
1893	" "	217,792
1894	" "	209,250
1895	" "	216,206
1896	" "	234,941
1897	" "	234,909
1898	" "	237,358
1899	" "	238,125
1900	" "	243,624
1901	" "	255,979
1902	" "	271,728
1903	" "	298,842
1904	" "	321,533
1905	" "	330,739
1906	" "	382,141
1907	Seven Commissioners.....	616,597
1908	" "	736,530
1909	" "	988,936
1910	" "	1,163,336
1911	" "	1,290,978
1912	" "	1,469,689
1913	" "	1,560,404
Increase in 25 years.....		1495 per cent

RECOMMENDATIONS

In conclusion I would reiterate the following recommendations:

STATISTICS.

Congress should relieve the Commission of the duty of collecting and compiling statistics, to the end that these may be restored to their true office of providing early, accurate and unbiased information respecting railway operation. They might well be entrusted to a Bureau of the Department of Commerce and Labor. It is essential to the highest use of statistics that they shall not be compiled under the sole supervision of the authority charged with their judicial interpretation.

ACCIDENTS.

As the prevention of accidents and not the adoption of various patented devices or imposing fresh and onerous regulations on the railways should be the controlling idea of all investigations of railway accidents, their investigation should be vested in a Board of Inspectors independent of the Interstate Commerce Commission

The system of investigating railway accidents in the United Kingdom which has been in successful operation for half a century affords an example by which we might profit. The chief inspectors are men of exceptional qualifications and independent judgments. Their opinions are not formed to please the companies or catch the popular ear. Their suggestions have the weight of authority and experience more effective than an act of parliament.

There has been a marked improvement in the character of official investigations into railway accidents during the year, but the reports are still couched in terms more becoming in a prosecutor than in judicial findings.

SLASON THOMPSON.

April 15, 1914.

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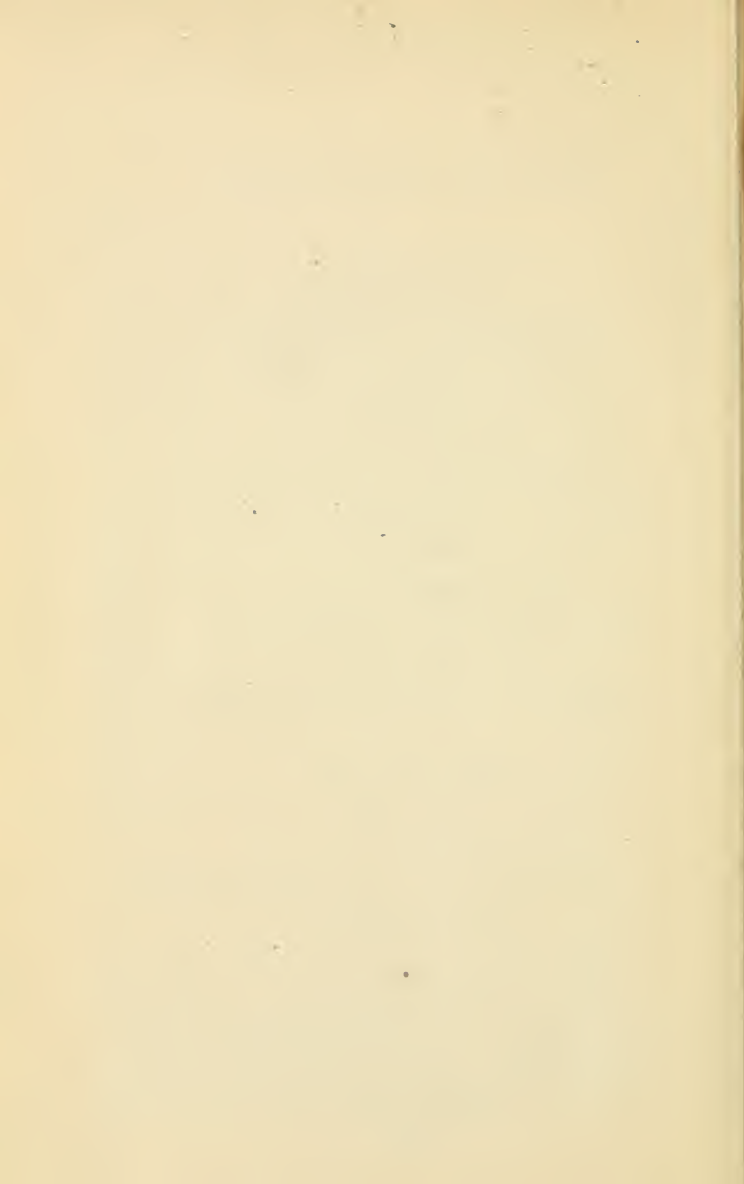
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